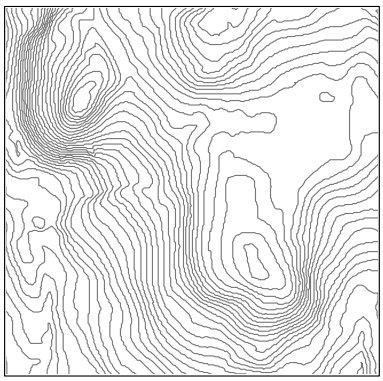
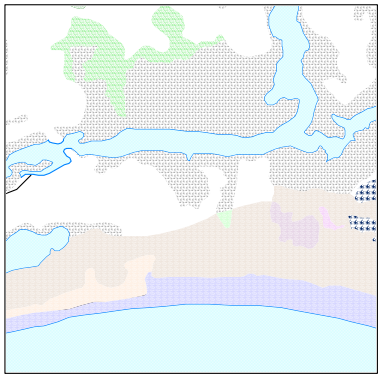


MassGIS DATALAYER DESCRIPTIONS and GUIDE TO USER SERVICES



July 2001

MassGIS
251 Causeway St., Suite 900
Boston, MA 02114

***M** assachusetts*
Geographic Information System
Commonwealth of Massachusetts Executive Office of Environmental Affairs

MassGIS is the Commonwealth's Office of Geographic and Environmental Information

MassGIS DATALAYER DESCRIPTIONS and GUIDE TO USER SERVICES

July 2001

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MassGIS has new contact information (as of November 2000):

Mailing Address:
EOEA - MassGIS
251 Causeway Street, Suite 900
Boston, MA 02114

Phone: (617) 626-1000
Fax: (617) 626-1249

See page 3 for full staff list

MassGIS is located on the 5th floor, but our mailing address is as listed above.

Catalog edited by Michael Trust

Content written 1990-2001.
Contributors include Anita Beinikis, Jim Brown, Katie Busse, Diane Carle, Gretchen Eliason, Aleda Freeman, David Freidenfeld, Mark Goodwin, Dorothy Graaskamp, Robert Hames, Barbara Hopson, Christian Jacqz, Daniel Martin, Carl Nylen, Dominique Pahlavan, John Rader, Tara Manno Richer, Aaron Richer, Liz Sorenson, Michael Steinitz, David Szczebak, Julie Sweitzer, Michael Trust

HOW TO USE THIS GUIDE

This catalog describes the products and services available from MassGIS. It is divided into two major sections. Section 1 provides a brief definition of GIS, the history and mission of MassGIS, and a list of additional sources of GIS information and data. Section 1 also describes the data and map ordering process and data development services available from MassGIS, including the MassGIS Data Viewer. Ongoing data development projects are also described. Section 1 also contains an overview of the ARC/INFO "Librarian" data storage format used by MassGIS, and a complete description of the MassGIS Data Standard for documentation of data (metadata).

The bulk of the catalog, Section 2, contains descriptions of the MassGIS data ("datalayers"). For each datalayer available from the Executive Office of Environmental Affair's (EOEA) geographic database, detailed descriptions of data sources, scale, production techniques, and database attributes are provided. Following this section are reference lists and index maps that are helpful when using and ordering maps and data.

This catalog is a handy reference to have available when working with MassGIS data. The information contained in this Guide is also maintained on the MassGIS Web site: http://www.state.ma.us/mgis.

MassGIS ON THE WEB

Check our Web site for the most recent developments at MassGIS and additional resources:

- MassGIS makes available all its data online, free of charge. Just click on the "Download Free Data" link on the home page.
- Order paper maps and digital data on CD-ROM, including the MassGIS Data Viewer. Just click on the "Order Maps and CDs" link on the home page.
- Browse data using one of several online mapping viewers, including Digital Orthophotos, USGS Quadrangle maps, and Protected Open Space. Choose the "Online Mapping" link for details.

http://www.state.ma.us/mgis

MassGIS PRODUCTS AND SERVICES

What is GIS?

A Geographic Information System (GIS) is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information (i.e. spatial data). This system should include:

- Hardware (computers, printers, plotters, scanners, digitizers, GPS units, etc.)
- Software (programs like ArcInfo, ArcView, MapInfo, Maptitude, AutoCad Map, GeoMedia, etc.)
- Data (files that may be loaded into the software programs, such as roads, town boundaries, parcels, aerial photographs, etc.)
- Staff (analysts, technicians, etc.)

Geographic information systems belong to a family of mapping and drafting programs that includes computer-aided design (CAD) and automated mapping and facilities management (AM/FM). GIS is distinguished from CAD and AM/FM by its capacity to perform complicated analytical functions that often include combining information from different sources to derive meaningful relationships.

The Web has a vast amount of resources relating to GIS. For more general information on GIS you may want to visit the following sites:

- http://info.er.usgs.gov/research/gis/title.html - **Introduction to GIS** from the U.S. Geological Survey
- http://www.census.gov/ftp/pub/geo/www/faq-index.html - A list of **frequently asked questions** (and their answers!) on GIS, from the U.S. Census Bureau
- http://www.umass.edu/masscptc/gis.html - **Introduction to GIS** from the Massachusetts Citizen Planner Training Collaborative at UMass Amherst
- http://www.geo.ed.ac.uk/agidict/welcome.html - **GIS Dictionary**, from the Association for Geographic Information
- news:comp.infosystems.gis is a Usenet resource (newsgroup) to which anyone with an interest in GIS may post questions

What is MassGIS?

MassGIS is the Commonwealth's Office of Geographic and Environmental Information, within the state's Executive Office of Environmental Affairs. Through MassGIS, the Commonwealth of Massachusetts has created a comprehensive, statewide database of spatial information for environmental planning and management. Recent legislation has established MassGIS as the official state agency assigned to the collection, storage and dissemination of geographic data. The legislation gives MassGIS the mandate to:

- Collect, consolidate, store and provide geographic and environmental information in order to improve stewardship of natural resources and the environment, promote economic development and guide land-use planning, risk assessment, emergency response and pollution control
- Expand library of GIS and related environmental information and provide access to that library
- Foster cooperative data development and data sharing
- Set standards for the acquisition and management of geographical and environmental data by any agency, authority or other political subdivision of the Commonwealth
- Provide technical support to municipalities and regional agencies
- Establish regional service centers
- Establish statewide advisory board
- Coordinate scientific and technical expertise

The evolution of Geographic Information Systems in the Commonwealth is not unlike its development in other states. A lead agency, in this case the Executive Office of Environmental Affairs (EOEA), perceived an opportunity to meet its goals through development of a statewide GIS. Three related feasibility studies were funded, a plan for development was negotiated with EOEA's agencies, and that plan was implemented

over a five-year period, creating the Massachusetts Geographic Information System - MassGIS - in the late 1980s. As a result, EOEA has become a leading provider of digital geographic information within the Commonwealth and among Massachusetts public agencies using geographic information technology.

EOEA is a cabinet level office that coordinates five environmental and natural resource departments:

- Department of Environmental Management (DEM)
- Department of Environmental Protection (DEP)
- Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE)
- Department of Food and Agriculture (DFA)
- Metropolitan District Commission (MDC)

Besides MassGIS, other offices within EOEA include:

- Massachusetts Environmental Policy Act (MEPA)
- Massachusetts Coastal Zone Management Office (MCZM)
- Office of Technical Assistance (OTA)
- Division of Conservation Services (DCS)
- Massachusetts Environmental Trust

MassGIS now has close to sixty users within EOEA who have direct access to the system software and as many as twenty projects in progress at any given time. MassGIS staff operates ARC/INFO and ArcView GIS software on DEC Alpha, Sun, and Windows NT and 2000 computer systems, maintains color inkjet large-format plotters, two color LaserJet small-format printers, and a large-format drum scanner. MassGIS distributes data from its database to municipalities, schools, non-profit programs, and the general public in the form of paper maps and CD products, as well as via free download from its Web site.

Contacts/Where to turn for more information

MassGIS

Main Phone: (617) 626-1000 **Fax: (617) 626-1249**
EOEA - MassGIS
251 Causeway St., Suite 900
Boston, MA 02114

Map and Data Orders (status and information):
- *Dan Marrier 626-1237* daniel.marrier@state.ma.us

MassGIS Assistant Director:
- *Neil MacGaffey 626-1057* neil.macgaffey@state.ma.us

GIS Database, Orthophotos and Website:
- *Michael Trust 626-1195* michael.trust@state.ma.us

MassGIS Data Viewer:
- *Aleda Freeman 626-1193* aleda.freeman@state.ma.us

Community Preservation Initiative Coordinator:
- *Jane Pfister 626-1194* jane.pfister@state.ma.us

Massachusetts Watershed Initiative:
- *Dominique Pahlavan 626-1184* dominique.pahlavan@state.ma.us

Open Space Mapping Project:
- *Scott Costello 626-1076* scott.costello@state.ma.us

Global Positioning System (GPS) sign-out/Scanning services:
- *Philip John 626-1185* philip.john@state.ma.us

GIS In The Classroom:
- *Paul Nutting 626-1238* paul.nutting@state.ma.us

System Administrator:
- *Gregory Mandryk 626-1186* gregory.mandryk@state.ma.us

MassGIS Director:
- *Christian Jacqz 626-1056* christian.jacqz@state.ma.us

GIS at Other State Agencies

Central Transportation Planning Staff: 617-973-7077
Coastal Zone Management: 617-626-1222
Department of Environmental Management: 617-626-1381
Department of Environmental Protection: 617-292-5675
Department of Fisheries, Wildlife and Environmental Law Enforcement: 617-626-1592
Department of Food and Agriculture: 508-792-7712
Department of Housing and Community Development: 617-727-7001 x 443
Executive Office of Transportation and Construction: 617-973-8239
Massachusetts Historical Commission: 617-727-8470
Massachusetts Water Resources Authority: 617-241-6346
Metropolitan District Commission:
Division of Watershed Management: 617-727-5274 x288
Metro Parks: 617-727-5264 x661

Massachusetts Geographic Information Council (MGIC)

The Massachusetts Geographic Information Council (MGIC, pronounced "magic") is an informal organization of GIS professionals from Federal, state, regional, and local government, public and private utilities, educational institutions, and businesses. The Council organizes monthly user meetings featuring presentations on GIS and related topics. Participation in MGIC is open to all. For more information contact MassGIS at (617) 626-1057, or the Information Technology Division (ITD) at (617) 973-0865. MGIC. See http://www.state.ma.us/mgis/mgic_ix.htm.

Regional Planning Authorities

Regional planning authorities provide data and other services to their member communities.

Berkshire Regional Planning Commission: 413-442-1521
Cape Cod Commission: 508-362-3828
Central Massachusetts Regional Planning Commission: 508-756-7717
Franklin Regional Council of Governments: 413-774-3167
Martha's Vineyard Commission: 508-693-3453
Merrimack Valley Planning Commission: 978-374-0519
Metropolitan Area Planning Council: 617-451-2770
Montachusett Regional Planning Commission: 978-345-7376
Nantucket Planning and Economic Development Commission: 508-228-7237
Northern Middlesex Council of Governments: 978-454-8021
Old Colony Planning Council: 508-583-1833
Pioneer Valley Planning Commission: 413-781-6045
Southeastern Regional Planning and Economic Development District: 508-824-1367

Other Regional GIS Programs

Essex County Registry of Deeds: 978-741-0201 x217

New England State GIS Programs - In addition to Massachusetts, all other New England states maintain a state GIS office. For information on data services in other New England states call:

Connecticut GIS: 203-424-3540
Maine Office of GIS: 207-287-3897
New Hampshire GRANIT: 603-271-2155
Rhode Island GIS (RIGIS): 401-222-6483
Vermont Center for Geographic Information (VCGI): 802-656-4277

In addition to the sources listed above, there are a number of professional organizations and publications that provide information on GIS and related topics. Contact MassGIS for more information or visit http://www.state.ma.us/mgis/resources.htm.

Data and Map Ordering Services

MassGIS offers digital data distribution and map production services. These services are available to both the public and private sectors. Maps can be purchased by submitting an order form online or via fax or mail. Digital GIS data can be obtained free by download from this site or purchased by submitting an order online or via fax or mail. In addition, non-profit, government, and educational organizations may receive digital data through our grant or data exchange programs.

Map Production and Printing

Overview of Map Products

MassGIS maintains color Hewlett-Packard inkjet plotters to produce maps from the EOEA geographic database. MassGIS has prepared a number of Map "Themes" (see section below) to facilitate distribution of frequently requested GIS data in the form of maps. All maps are prepared when ordered and display the most current data. MassGIS does not produce custom maps. Map products include:

DEP MCP 21e Site Maps:

- Cost: $25.00 for the first sheet, $5.00 for additional copies of the same map.
- Size: 8" x 11", printed on an HP color Laserjet 4500.
- Scale: 1:15,000
- When ordering, you must provide UTM, Latitude-Longitude, or Mass. Stateplane coordinates for the site you wish to have mapped. No site maps can be produced without coordinates.

Standard Large Format Maps

- Cost: $25.00 for the first sheet, $5.00 for additional copies of the same map.
- Maximum size: 33" x 46" (based on area mapped), printed on an HP 755 or HP 3500 plotter
- Scale: 1:25,000 for most maps (large areas may be plotted at smaller scales)
- When ordering, you pick the area you would like mapped (i.e. "towns of Cohasset & Scituate).
- Themes available are listed below.

Shoreline Change Maps:

- Cost: $20.00 per map sheet.
- Size: 33" x 46", printed on an HP 755 plotter.
- Maps may be ordered according to the Shoreline Change Index (at back of catalog).

Wetlands atop Orthophoto Maps:

- Cost: $15.00 per map at 1:5,000 scale; $10.00 for map at 1:10,000 scale.
- Size: 33" x 43", printed on an HP 755 color plotter.

All large format maps are printed on white, HP Coated paper. Printing on mylar or other media is not supported. Site Maps are usually run on Tuesdays and are mailed by U.S. Mail on Wednesdays. You may indicate on the order form that you would like to pick up your map(s)in person or have them shipped by an overnight courier.

How to Order Maps

Submit a request for any map via

- the Online Order Form at http://www.state.ma.us/mgis/order.htm
- the Order Form for maps at the end of this section

Fax it to **(617) 626-1249**, or mail to: **EOEA - MassGIS**
Attn: Map Request
251 Causeway St., Suite 900
Boston, MA 02114

Note: This is a new address and fax for MassGIS (as of Nov. 2000)

Payment

If an order is placed online or by fax, or if a mail request does not include payment, an invoice for total fees will be included with your order. Payment is to be made via check or money order made out to the Executive Office of Environmental Affairs. We do not accept cash or credit cards.

Note about Charges: The Massachusetts Legislature established a schedule of fees to be charged by EOEA for digital data and cartographic services under the Budget Control and Reform Act of 1989 (Ch.653, §138). Each product is placed in a price category according to the complexity of the data or service. The charges are intended to recover the costs of labor, materials, and computer processing time expended in fulfilling requests.

Map "Themes" Available for Printing

DEP MCP (21E) Numerical Ranking System (Site or Large-format)

Displays all environmental data suitable for a Massachusetts Contingency Plan (MCP or Chapter 21E) site assessment as required by the Department of Environmental Protection, including Potentially Productive Aquifers, Non-potential Drinking Water Source Areas (shown by high and medium yield), Sole Source Aquifers, Public Water Supplies, Zone IIs, Interim Wellhead Protection Areas, Wetlands, Protected Open Space, Areas of Critical Environmental Concern, DEP Permitted Solid Waste Facilities, NHESP Habitats and Certified Vernal Pools, and base map features. Site maps are 8½" x 11" in size, printed at 1:15,000 scale and include 500' and 1/2 mile radii around client-specified coordinates. Quads and most municipalities are printed at 1:25,000 scale.

Current Land Use

Displays in color all twenty-one categories from the Current Land Use datalayer and base map features. Data is suitable for use at 1:25,000 scale or smaller; however, at *much* smaller scales, this data may become undistinguishable.

Protected Open Space

Displays Protected and Recreational Open Space parcels compiled by the Open Space Mapping Project with base map features. Parcels are color-coded to indicate by which public, private or non-profit agency they are owned. This theme will display the most recent data verified by the Open Space Project as of the date of printing.

Protected Open Space/Water Resources

Displays Protected and Recreational Open Space parcels compiled by the Open Space Mapping Project with Aquifers (high- and medium-yield), Zone IIs, Interim Wellhead Protection Areas, Areas of Critical Environmental Concern, wetlands, Public Water Supplies and base map features.

Title 5

Displays areas affected by Title 5 regulations, including estimated setbacks, water resources (drainage basins, Zone IIs, IWPAs, hydrography, wetlands, NHESP Vernal Pools and Public Water Supplies), ACECs, DEP Permitted Solid Waste Facilities and base map features. Detailed data sources and guidance notes for map use are included. Available by municipality or quad.

Wetlands Habitats

Displays Estimated Habitats of State-listed Rare Wetlands Wildlife and Certified Vernal Pools, Open Space, wetlands and base map features. Produced by the Natural Heritage and Endangered Species Program for use with the Wetlands Protection Act Regulations only. Available by town.

Surficial Geology

Displays 1:250,000 scale surficial geology and base map features. Strictly recommended for regional map extents, this map theme should not be used for site-specific analysis.

Community Water Supply

Displays Aquifers (high- and medium-yield), Drainage Basin and Sub-Basin boundaries, Public Water Supplies (with annotation), DEP-approved Zone IIs, Interim Wellhead Protection Areas, watershed areas (including MDC/MWRA Water Supply Watersheds and Emergency/Backup Water Supply Watersheds), wetlands, hydrography, Open Space, Areas of Critical Environmental Concern, DEP Permitted Solid Waste Facilities, Discharge Points, and base map features.

Outstanding Resource Waters

Displays Outstanding Resource Waters (contributing areas of a public water supply and water bodies within certain parks, wildlife refuges, and ACECs), Solid Waste Landfills, Basin and Sub-Basin boundaries, Public Water Supplies (with annotation), DEP-approved Zone IIs, Interim Wellhead Protection Areas, wetlands, hydrography, NHESP Vernal Pools, and base map features.

Priority Resources

Displays Aquifers (high- and medium-yield, Potential and Non-potential Drinking Water Source Areas, EPA Designated Sole Source), Major and Minor Basin boundaries, Public Water Supplies (annotated), Zone IIs, Interim Wellhead Protection Areas, wetlands and hydrography (scale sensitive), Open Space, Areas of Critical Environmental Concern, NHESP Wetlands Habitats, DEP Permitted Solid Waste Facilities, Surface Water Protection Areas (Zone As) and base map features.

Water Supply Protection

Displays developed lands (high-density residential, commercial, industrial, waste disposal), Aquifers (high- and medium-yield), Drainage Basin and Sub-Basin boundaries, Public Water Supplies (with annotation), DEP-approved Zone IIs, Interim Wellhead Protection Areas, watershed areas, wetlands and hydrography (scale sensitive), and base map features.

Water Supply Protection/Land Use

Displays 21 classifications of current land use, Aquifers (high- and medium-yield), Public Water Supplies (with annotation), DEP-approved Zone IIs, Interim Wellhead Protection Areas, hydrography (scale sensitive), DEP Permitted Solid Waste Facilities, Areas of Critical Environmental Concern, NPDES Discharge Locations, Discharge to Groundwater Permit Locations, and base map features.

Solid Waste Assessment

Displays both the DEP MCP 21E and Land Use themes as 2 separate maps on one page. Includes ½- and 1-mile DEP Permitted Solid Waste Facilities buffers. Available for a municipality or quad.

Solid Waste Facilities and Selected Natural Resources

Displays DEP-approved Zone IIs and Interim Wellhead Protection Areas, public water supply wells and surface water supply intakes, surface waters (no wetlands), medium and high yield aquifers, sole source aquifers, Areas of Environmental Concern, solid waste landfills shaded for status (active, inactive, closed), other solid waste facilities, major basin boundaries, roads, trains and transmission lines. Recommended for regional extents (e.g. DEP Regions, basins, counties).

Shoreline Change

For coastal communities, the Massachusetts Coastal Zone Management (MCZM) office has generated a set of shoreline change maps covering the entire Massachusetts outer (ocean-facing) shoreline, documenting erosion and accretion trends by displaying three to four historic shorelines between the mid-1800s to 1978. The maps, called Historic Shoreline Change Analysis Maps, are printed at a scale of 1:10,000. These maps have the long-term shoreline change rate calculated and printed at 50-meter intervals along the shore. Tables and histograms displaying all short- and long-term shoreline change rates accompany these maps.

DEP Eelgrass Resources

Displays the eelgrass, Zostera marina, resources for the entire state coastline.The eelgrass data was photo-interpreted and extensively field checked during the years 1994 thru 1997. The data is projected onto a NOAA Navigational Chart base that includes coastal features and bathymetry. The maps can be produced at varying scales depending on the area of interest. The maps are available in two sizes: 24x26 in. ($15.00) and 32x38 in. ($20.00).

Wetlands Orthophoto (at 1:5,000 or 1:10,000 scale)

Maps display wetlands features together with hydrological connections as part of Massachusetts Wetlands Inventory atop black and white orthophotography. Features include all open water areas, swamps, marshes, bogs, and dunes, together with coastal systems of tidal flat, rocky shore, beach, and barrier beach environments. Hydrological connections depict both active and intermittent stream courses. 1:5,000 scale maps ($15.00) are tiled by Massachusetts State Plane orthophoto quads and display 1-meter resolution orthophotography, while 1:10,000 scale maps ($20.00) include four orthophoto quads, both in the same 32” by 32” area, with 2-meter resolution orthophotography. The entire 43” by 33” sheet area includes legend, description of wetlands codes and methodology, together with inset map pinpointing location of quad or quads in a larger context of roads and towns
.

Digital Data Products

Overview

The Executive Office of Environmental Affairs (EOEA) has become a leading provider of digital geographic information within the Commonwealth of Massachusetts. Data distribution is the primary service offered to the public by MassGIS. MassGIS distributes sets of data on compact disc covering the entire state or custom orders of data for any geographic area of the state (a town, watershed, etc.). **All data are referenced to the Massachusetts Stateplane Mainland Zone (FIPSZONE 2001) coordinate system, Datum NAD83, units Meters.**

See the Datalayer Descriptions section of this catalog for details on the available datalayers. These data may be divided into two groups, as follows:

Vector data (point, line/arc, area/polygon) are available for distribution in the following formats:

- ARC/INFO Coverages, stored in Librarian ESRI Shapefiles ARC/INFO Export Files (.e00)
- Shapefiles and Export files can be imported into a wide range of GIS software packages including ARC/INFO, ArcView GIS, MapInfo, Maptitude, GeoMedia, and AutoCAD Map, among others. Arc coverages may be loaded directly into ARC/INFO, ArcView, and GeoMedia.

Image data, including orthophotos ans scanned USGS Quadrangle Maps are distributed in these formats:

- TIFF
- MrSID
- BIL (half-meter orthos only)

TIFF images may be used in nearly all software that can display imagery. The MrSID format, which allows high levels of compression with very little loss in quality, is integrated into ArcInfo 8 and may be used in ArcView GIS 3.1 and above by loading the "MrSID Image Support" extension that comes with ArcView. MapInfo 5.0 users may download the free "MrSID Module for MapInfo Professional 5.0" utility from Lizardtech, the maker of the MrSID format. If you'd like to view MrSID images outside of ArcView or MapInfo, you may use the free stand-alone "MrSID Viewer," also available from Lizardtech. For complete descriptions and downloads of these products, visit http://www.lizardtech.com, click on the GIS tab, and then select the "MrSID Viewers" link from the "Products" section in the left-hand margin. Other software vendors are now incorporating support for MrSID into their products.

Standard Data Products

Vector Data	
Item	***Price***
Regional MassGIS Data Viewer - All vector and image data for a particular area of the state (i.e. a town, watershed, etc.), specified by the user, on a single CD *. Includes: • Vector data for all Available Datalayers as ARC/INFO Librarian coverages • Scanned USGS Quad Images • 1:5,000 Black & White Orthophotos • ArcView project file (.apr), complete with legends (.avl files) and other enhancements for easy display of data, for use in ArcView 3.0a, 3.1.1, and 3.2; includes Watershed Analyst and Massachusetts Resource Identification Project tools. • "Runtime" Viewer, a stand-alone, scaled-down version of the ArcView 3.1.1 software for users who do not have any GIS software. • Complete metadata (documentation) Does not include point elevations (sold separately, see below). NHESP layers may be requested specifically on order form. ** If Viewer requires multiple CDs, a charge of $50.00 will be added for each additional CD. Each CD holds a maximum of 650 megabytes of data.*	**$50.00**
Statewide MassGIS Data Viewer - All vector data for the entire state. Multiple-CD set includes: • Vector data in ARC/INFO Librarian coverage format for all Available Datalayers. • ArcView project file (.apr), complete with legends (.avl files) and other enhancements for easy display of data, for use in ArcView 3.0a, 3.1.1, and 3.2. • "Runtime" Viewer, a stand-alone, scaled-down version of the ArcView 3.1.1 software for users who do not have any GIS software. • Complete metadata (documentation) Does not include point elevations (sold separately, see below) or NHESP layers (may be downloaded).	**$100.00**

Statewide Vector Data (ESRI Shapefiles) - All vector data for the entire state. Multiple-CD set includes: • Vector data in ESRI Shapefile format for all Available Datalayers. • Legend files (.avl) for display in ArcView • Complete metadata (documentation) Does not include point elevations (sold separately, see below) or NHESP layers (may be downloaded).	**$100.00**
Statewide Vector Data (Arc Export Files) - All vector data for the entire state. Multiple-CD set includes: • Vector data in ARC/INFO Export file format (.e00) for all Available Datalayers. • Legend files (.avl) for display in ArcView • Complete metadata (documentation) Does not include point elevations (sold separately, see below) or NHESP layers (may be downloaded).	**$100.00**
Point Elevation Data - Point data representing elevations. Multiple-CD set includes: • Elevation data interpreted from 1:5,000 digital orthophotos, for the entire state. • Available as ESRI Shapefiles or ARC/INFO Export Files	**$75.00**
DXF Author – Software utility to convert ARC/INFO coverages and ESRI Shapefiles to DXF files. Details below.	**Free**

Image Data – Orthophotos	
Item	***Price***
Individual 1-meter 1:5,000 Orthophotos (MrSID format) – Digital black and white orthophotos for the entire state. Multiple-CD set includes: • 1600 individual images, one-meter pixel resolution, tiled by the Orthophoto Quad index, • .SDW header files for georeferencing in GIS software • Reference index map showing location of images	**$100.00**
1-meter 1:5,000 Orthophotos (MrSID format) Mosaics – Digital black and white orthophotos for the entire state. 10-CD set includes: • 10 images, 1-meter pixel resolution, each covers a large area of the state, Images some overlap. • .SDW header files for georeferencing in GIS software • Reference index map showing location of images See the Tiling Scheme *Note:* Individual mosaics may be ordered as a custom order at $50 per CD.	**$200.00**
Individual Half-meter 1:5,000 Orthophotos (MrSID format) - Digital black and white orthophotos for the entire state. 10-CD set includes: • 1600 individual images, 1/2-meter pixel resolution, tiled by the Orthophoto Quad index • .SDW header files for georeferencing in GIS software • Reference index map showing location of images	**$200.00**
1-meter Coastal Color Orthophoto (MrSID format) Mosaic - Digital color orthophoto for the entire Massachusetts coastline on a single CD. Includes: • One single image, one-meter pixel resolution, covering the entire coastline, including the Islands • .SDW header files for georeferencing in GIS software	**$50.00**

Image Data – USGS Topographic Maps	
Item	***Price***
Statewide Scanned USGS Quad Images (TIFF format) – Digital versions of all the USGS Topographic maps for Massachusetts. 5-CD set includes: • 1600 individual images, tiled by the Orthophoto Quad index, in TIFF format. Images are "seamless" (all map margins removed) • .TFW header files for georeferencing in GIS software • Reference index map showing location of images • "Runtime" Viewer, a stand-alone, scaled-down version of the ArcView 3.1.1 software for users who do not have any GIS software to allow for easy viewing of the images. ▪ Complete metadata (documentation)	**$100.00**
Statewide Scanned USGS Quad Images (MrSID format) – Digital versions of all the USGS Topographic maps for Massachusetts on one CD. Includes: ▪1600 individual images, tiled by the Orthophoto Quad index, Images are "seamless" (map margins removed) ▪.SDW header files for georeferencing in GIS software ▪Complete metadata (documentation)	**$50.00**
Single Statewide Scanned USGS Quad Image (MrSID format) - Digital version of all the USGS Topographic maps for Massachusetts on one CD. Includes: ▪ One seamless statewide image, 2-meter pixel resolution, in MrSID format. ▪ .SDW header file for georeferencing in GIS software ▪ Complete metadata (documentation)	**$50.00**

Custom Data Products

Custom data orders cost **$50.00 per CD**. Each CD holds a maximum of 650 megabytes of data and may include any of the following:

Vector Data

- **ARC/INFO Export Files** for a user-specifed region of the state (i.e. a town, watershed, etc.)
- **ESRI Shapeiles** for a user-specifed region of the state (i.e. a town, watershed, etc.)

Orders of this type may include all Available Layers, or just certain themes. User must specify an area of interest when ordering.

Image Data

When ordering a custom CD of images, you may choose any of these listed here. On the orderform simply list the resolution and type and provide an area of interest (i.e. "1- and 2-meter black & white Tiffs for the Town of Braintree")**.**

1:5,000 Black & White Orthophotos

- 1-meter (TIFF and MrSID formats, individual images)
- 1-meter (MrSID format - large regional mosaics; see tiling scheme at back of catalog)
- 2-meter (TIFF only)
- 5-meter (TIFF only)
- half-meter (MrSID and BIL formats)

Coastal Color Orthophotos

- 1-meter (TIFF and MrSID formats)
- 2-meter (TIFF only)

To help figure the total cost of a custom order of images, use this table of individual ortho file size and CD capacity:

Image Type	Pixel Resolution	TIFF		MrSID	
		File Size	Qty./CD	File Size	Qty./CD
1:5000 Black & White	1/2 meter *	64 MB	10	5 MB	130
	1 meter	16 MB	40	800 kb	750
	2 meter	4 MB	162	n/a	-
	5 meter	640 kb	1015	n/a	-
Coastal Color	1 meter	48 MB	13	2.5 MB	260
	2 meter	12 MB	54	n/a	-

* - Half-meter orthos are available in BIL, not TIFF format. BIL images may be used in ArcInfo and ArcView as well as other software. MassGIS will convert the BILs to TIFFs for an additional charge of $25 per order.

A Note about DXF Data

Users often request data from MassGIS as DXF files for use in AutoCAD software. Though MassGIS does not produce or maintain data in DXF format, users may convert our data to DXF via one of the following methods:

- Load any data into the free "DXFAuthor" utility, a stand-alone piece of software for Windows 95/98/NT 4.0. A series of Wizards will lead you through the conversion process. Please see the Web page http://www.state.ma.us/mgis/ dxf.htm for details and to download.
- Load any of our data in Arc coverage format into ARC/INFO and use the ARCDXF command

How to Order Data

- **Data Purchase** - Available to all users from either the public or private sector by submitting the MassGIS OrderForm:
  - Use the Online Order Form at http://www.state.ma.us/mgis/order.htm, or
  - Print a copy of the Order Form for Digital Data at the end of this section

Fax it to **(617) 626-1249**, or mail to: **EOEA - MassGIS**
Attn: Data Request
251 Causeway St., Suite 900
Boston, MA 02114

Note: This is a new address and fax for MassGIS (as of Nov. 2000)

If an order is placed online or by fax, or if a mail request does not include payment, an invoice for total fees will be included with your order. Payment is to be made via check or money order made out to the *Executive Office of Environmental Affairs*. We do not accept cash or credit cards.

Order Form for Maps

to be provided by the Massachusetts Executive Office of Environmental Affairs

Please use this order form to request one printed map to be generated using MassGIS data. The MassGIS *Datalayer Descriptions and Guide to User Services* describes the available map themes and datalayers in detail; to receive a copy please check this box: ☐

Step 1: Provide the following Client Information:

Organization			Date
Contact Name			Check or P.O. #
Address			Telephone
Town	State	Zip Code	FAX
E-Mail Address			

Step 2. Choose a Map Theme:

$25.00 each ($5.00 for additional copy of same map):

___ Land Use
___ Open Space
___ Title 5
___ Wetlands Habitat
___ Surficial Geology
___ DEP MCP (21E) NRS (Site or Large Format Map)
___ Water Supply Protection
___ Water Supply Protection/Land Use
___ Solid Waste Assessment
___ Solid Waste Facilities/Selected Natural Resources
___ Priority Resources
___ Open Space/Water Resources
___ Community Water Supply
___ Outstanding Resource Waters

$20.00 each copy:

___ DEP Eelgrass Resources (32"x 38" page size)
___ Wetlands atop 2-meter Orthophoto (1:10,000)
___ Shoreline Change

$15.00 each copy:

___ DEP Eelgrass Resources (24"x 26" page size)
___ Wetlands atop 1-meter Orthophoto (1:5,000)

Step 3. Choose one of the following two formats:

____ **Large Format Map** (any theme listed above)
Map size and scale will vary depending on the area portrayed. Maximum size is 46" x 33". Maps of USGS quadrangles are printed at 1:25,000 scale.

List town, quad, or region name/number, or Shoreline Change ID:

_____ **Site Map** (21E Theme only)
Map will be 8½" x 11" in size and printed at 1:15,000 scale. Radii of 500 feet and ½ mile around the specified coordinates will be shown.

Coordinates (UTM or LL [deg, min, sec]) - **REQUIRED**
N
E/W
Site Name and address - OPTIONAL

Basic fee (see costs listed above in Step 2):	
Additional copies of the same map _____	
TOTAL - Please attach a check or money order or a purchase order for this amount:	

Please print this form and return with a purchase order, check or money order payable to the Executive Office of Environmental Affairs. Mail to EOEA-MassGIS, Attn: Map Order, 251 Causeway Street, Suite 900, Boston, MA 02114 or Fax to (617) 626-1249. Phone (617) 626-1237 / -1057

Also order online: http://www.state.ma.us/mgis/order.htm

Order Form for Digital Data

to be provided by the Massachusetts Executive Office of Environmental Affairs

Please use this order form to request one printed map to be generated using MassGIS data. The MassGIS *Datalayer Descriptions and Guide to User Services* describes the available map themes and datalayers in detail; to receive a copy please check this box: ☐

Step 1: Provide the following Client Information:

Organization			Date
Contact Name			Check or P.O. #
Address			Telephone
Town	State	Zip Code	FAX
E-Mail Address			

Step 2. Specify which Data Products you wish to receive:

MassGIS Data Viewer:

___ Regional CD. Specify Area (town, watershed, etc): _____ $50.00

(If Viewer requires multiple CDs, a charge of $50 will be added for each additional CD)

___ Statewide Data (4-CD set) $100.00

Vector Data:

___ Statewide Data - ESRI Shapefile format (Does not include PT Elevation Data) $100.00

___ Statewide Data - ARC/INFO Export File format (Does not include PT Elevation Data) $100.00

Point Elevation Data: ___ ESRI Shapefiles (2 CDs); ___ ARC/INFO Export Files (3 CDs) $75.00

Image Data:

Digital Orthophotos:

___ Individual 1-meter 1:5,000 Black & White (MrSID Format) - 3 CDs, 1600 individual images $100.00

___ 1-meter 1:5,000 Black & White Mosaics (MrSID Format) - 10 CDs, 10 individual images $200.00

___ Individual half-meter 1:5,000 Black & White (MrSID Format) - 10 CDs, 1600 individual images $200.00

___ 1-meter 1:10,000 Color Coastal Mosaic (MrSID Format) - 1 seamless image $50.00

Scanned USGS Quads:

___ Scanned USGS quads - (Tiff format, by orthoquad) – 5 CDs, 1600 individual images $100.00

___ Scanned USGS quads - (MrSID format, by orthoquad) - 1 CD, 1600 individual images $50.00

___ Scanned USGS quads - (MrSID format) - 1 seamless image $50.00

Custom Order:

Provide area of interest (i.e. town, watershed, etc) and image format (Tiff or MrSID) and resolution $50.00 per CD

TOTAL

Redistribution Agreement

The Massachusetts Executive Office of Environmental Affairs distributes digital cartographic data under the terms and conditions as outlined in the Purchase Agreement for Digital Data Provided by the Massachusetts Executive Office of Environmental Affairs. I/we acknowledge that submission of this order binds us to the terms and conditions of the agreement concerning use and distribution of this data that we have read and understand.

Authorized Signature _____ **Date** _____

Please print this form and return with a purchase order, check or money order payable to the Executive Office of Environmental Affairs. Mail to EOEA-MassGIS, Attn: Data Order, 251 Causeway Street, Suite 900, Boston, MA 02114 or Fax to (617) 626-1249. Phone (617) 626-1237 / -1057

Note MassGIS' new address and phone and fax numbers (as of Nov. 2000)

Also order online: http://www.state.ma.us/mgis/order.htm

MassGIS DATA DISTRIBUTION POLICY

Introduction

MassGIS is no longer using a "memorandum of understanding" (MOU) for data distribution; we have been advised that, legally, the existing MOUs are not appropriate.

MassGIS data are free to anyone who downloads them from the MassGIS web site. Maps created through our web site (via the Online Mapping section) will also be free. The only other maps we provide are the standard "Themes" (see page 7). If you cannot download data from our web site, you may request that a copy be sent to you. You may or may not be charged a reproduction fee (as provided for under Massachusetts public records laws - see the MassGIS purchase agreement for digital data in the next section; also see the Custodian of Public Records Web site at http://www.state.ma.us/sec/pre/preidx.htm), depending on what you are requesting and what kind of requestor you are. The categories of requestor are:

- Massachusetts Public Agencies, including public schools (no fees)
- Private Individuals, Private Companies, Non-Profit Organizations, and Non-Massachusetts Public Agencies (pay reproduction fees)
- Data Cooperator (no fees)
- Data/Map Grantee (no fees)

Details on each category are listed below.

Map Categories

"Maps" on this page refers to Large-format maps. All parties must pay for DEP MCP 21e Site Maps.

There are two maps for which there is always a reproduction fee:

1. Department of Environmental Protection (DEP) wetlands maps on orthophoto base (each copy $20 or $15, depending on paper size)
2. The Department of Fisheries, Wildlife, and Environmental Law Enforcement's (DFWLE) Natural Heritage and Endangered Species Program wetland habitat maps (first copy $25, subsequent copies $5).

These two maps are made by MassGIS for their respective agencies, which have established a policy of charging a fee to all map recipients.

3. Custom maps

We are not obligated by public records laws to create maps for which there is not already a software program that creates them. If we agree to create a custom map, the fee is the cost of the time (based on hourly rates for salary and overhead) for the staff person assigned to the task. This includes time needed for defining the map's scope (its geographic extent, scale, content, and purpose), time for producing any map drafts, and time for producing the final version of the map. Typically, a custom map requires one or two days of work, and does not involve creating map features not already in our database. Thus custom map costs will likely be between 150 and 300 dollars, or more. We typically do not accept requests for custom maps.

Data Distribution Requestor Categories

Massachusetts Public Agencies: No Fee for standard maps or data

You are a member of this category if you are:

- a state, regional, local government (town/city),
- or public educational institution. Public educational institutions include public elementary, middle, and high schools and the public colleges and universities (see Appendix A at the end of this section).

Data requests from state, regional, or local government agencies must be made by an employee. Individuals requesting data will become the point-of-contact for their department within their parent organization (e.g. town

department, agency bureau, etc.), and future requests may be referred to that individual. Requests from people at educational institutions must be made by a faculty or staff member, and there can only be one data recipient per department. Requests in this category are subject to the following limits:

- No more than 5 standard maps may be requested annually
- The data requested will fit on no more than 3 CDs
- A specific data layer may be requested once annually and if it has not changed since the last request, it will not be supplied again.

Citizens groups involved in public agency initiatives (e.g. watershed groups) cannot request data directly without paying the copying fees. An employee of the Massachusetts public agency involved may request the data directly and pass data on to the citizens group

Private Individuals, Non-Profit Organizations, Private Companies & Non-Massachusetts Public Agencies: Fee charged for maps and data

You are a member of this category if you are:

- a private company (consultant, engineering firm, etc.),
- a federal government or out-of state public agency,
- or a non-profit organization.

Private companies under contract to public agencies will be charged a fee. Public agencies may request the data directly for no fee and then pass it on to their contractors. Federal government agencies may become data grantees and non-profit organizations may become data cooperators or data grantees as described below.

Data Cooperator: No fee for data and up to 10 maps annually

Non-profit organizations may be eligible to become data cooperators and receive data with no fee. A data cooperator relationship is established by providing MassGIS with updates to an existing MassGIS data layer OR by providing metadata (in database or ASCII text format) for data sets developed by the non-profit organization. If a data cooperator is providing updates or additions to a data layer maintained by MassGIS, first contact MassGIS. Any updates/additions must be consistent with standards (accuracy, attribute naming and coding, etc.) established for the data layer by MassGIS. Metadata MUST comply with either the metadata standard established by the Federal Geographic Data Committee OR (for those familiar with it or with a preference for it) with the MassGIS metadata standard. Database file templates (dBase format) for MassGIS metadata are available on the MassGIS web site. Information about the FGDC metadata standard and tools for creating FGDC compliant metadata may be found on the MassGIS web site (on the Metadata Resources page – http://www.state.ma.us/mgis/munimeta.htm).

Once MassGIS has notified the organization in writing that it has been granted data cooperator status, the organization may request data on CD-ROM as a data cooperator. This request may occur no more than annually unless there is a project-specific need or there has been a substantial change to a data layer. Image files (e.g., orthophotos, USGS quadrangles) for a given area will not be provided more than once unless new imagery has been created. MassGIS may also request copies of any data sets developed by the data cooperator.

Data/Map Grantee: No fee for standard maps or data

There are two types of organizations in this category: (1) those working on projects involving the Executive Office of Environmental Affairs (EOEA) or any of its departments, and (2) those with no such project relationship.

1) Organizations working with EOEA or its one of its departments may be granted data or maps for a specific project (such as a buildout, an open space plan or community preservation plan) through a prior arrangement made with an EOEA employee. When requesting data through this category, the EOEA project and the contact's name, title, and phone number MUST be identified. Prior to requesting the data, the EOEA contact person should notify the MassGIS data orders staff via email (onlinemaps@MassMail.state.ma.us; put "fee status confirmation" in the e-mail subject if it does not automatically appear) stating who the request will come from and for what project.

2) MassGIS will also consider data or map-grant requests from organizations having no relationship to EOEA or its departments and meeting at least three of the following criteria:

- They cannot download data from MassGIS' web site (lack of or inadequate internet access)
- The organization is requesting data for an area that is less than 10 towns or that is a single watershed

- Their staff capable of using GIS software does not exceed two
- The organization's budget is less than $250,000
- Number of maps requested is no more than 5 and the data requested includes no more than 3 CDs requiring custom preparation.

If an organization wishes to be considered for a data or map grant, someone from that organization must submit the request in writing or via e-mail. The request must include the organization's name, the name and contact information for the person making the request, and what they are requesting. The request must identify which of the above criteria the requesting organization meets. Written requests should be mailed to:

MassGIS
251 Causeway Street, Suite 900
Boston, MA 02114
ATTN: Data Grant Requests

E-mail requests should be sent to onlinemaps@MassMail.state.ma.us; put "Data Grant Request" in the e-mail subject header if it does not automatically appear.

APPENDIX A - Massachusetts Public Universities and Colleges

University of Massachusetts Campuses

- Amherst
- Boston
- Dartmouth
- Lowell
- Medical Center

Massachusetts State Colleges

- Bridgewater State College
- Fitchburg State College
- Framingham State College
- Massachusetts College of Art
- Massachusetts College of Liberal Arts
- Massachusetts Maritime Academy
- Salem State College
- Westfield State College
- Worcester State College

Massachusetts Community Colleges

- Berkshire Community College
- Bristol Community College
- Bunker Hill Community College
- Cape Cod Community College
- Greenfield Community College
- Holyoke Community College
- Massachusetts Bay Community College
- Massasoit Community College
- Middlesex Community College
- Mount Wachusett Community College
- North Shore Community College
- Northern Essex Community College
- Quinsigamond Community College
- Roxbury Community College
- Springfield Technical Community College

PURCHASE AGREEMENT FOR DIGITAL DATA PROVIDED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

This Agreement outlines the recommended terms for purchase of digital data and/or digital data products provided by the ***Massachusetts Executive Office of Environmental Affairs*** (herein EOEA), located at 251 Causeway Street, Suite 900, Boston, MA 02114.

AUTHORITY

The legal authority for EOEA to recover and retain fees for the distribution of data under the terms of this Purchase Agreement is ***G.L.M. Chapter 240, Section 2C, line 2001-1001 of the Acts of 1989*** wherein EOEA is authorized to render "data processing services to state agencies, authorities and units of government within the Commonwealth" and to distribute "digital cartographic and other data". The fee schedule for the distribution of digital data and digital data products is established in ***Chapter 653, section 138, of the 'Budget Control and Reform Act of 1989'.***

JUSTIFICATION AND PURPOSE

EOEA administers, supervises and/or funds a variety of regulatory and management programs that are important to the environmental resources of the Commonwealth. EOEA and its agencies manage the Environmental Affairs Data Center, the MassGIS and several other environmental information system units which support their information management needs. It is the policy of EOEA to provide to its agencies, and other agencies, authorities and units of government and the private sector within the Commonwealth access to data and data processing services which will enhance the quality of environmental regulatory, management and resource decisions. It is the expressed intent of the General Court that EOEA should recover some of the costs associated with the provision of data and data processing services.

USE OF DATA PROVIDED BY EOEA

Data purchased from EOEA are part of the public record and subject to all the provisions of the Public Records Law. However, data provided by EOEA are intended for the use of the receiving agency, organization or individual. Re-distribution of the data by receiving agency without notification to EOEA is discouraged. EOEA suggests that recieving agencies, when possible, refer other parties interested in obtaining EOEA data directly to MassGIS. This recommendation is made in an effort to maintain data currency and ensure that data are correctly documented for the eventual user.

All maps or other documents produced using data or data products supplied through this agreement should contain a data source credit, prominently displayed, such as "source data supplied by the Massachusetts Executive Office of Environmental Affairs, MassGIS."

EOEA suggests that the purchasing agency, organization or individual employ using the data, attach or release a statement which includes the following.

"These digital data represent the efforts of the Massachusetts Executive Office of Environmental Affairs and its agencies to compile or record information from the cited source materials. EOEA maintains an ongoing program to record and correct errors in these data that are brought to its attention. EOEA makes no claims as to the absolute validity or reliability of these data or their fitness for any particular use. EOEA maintains records regarding all methods used to collect and process these digital data and will disclose this information upon request."

MassGIS Data Viewer

Introduction

The MassGIS Data Viewer is distributed on CD and contains MassGIS data for a specific area in Massachusetts (or for the entire state), and some tools with which to view the data. The Geographic Information System (GIS) data on the CD is a subset of the ESRI ARC/INFO format vector data which MassGIS maintains as Librarian Coverages. The CD(s) may also contain a subset of the image data (i.e orthophotographs and/or scanned USGS Topographic Quadrangle maps) that MassGIS maintains.

The MassGIS Data Viewer is a customized ArcView project (ArcView is an ESRI product). It consists primarily of a few key enhancements to native ArcView. The MassGIS Data Viewer was created specifically to be distributed and work with MassGIS data. However, it also was designed to be generic enough to work with any other spatial data supported by ArcView. The CD contains Data Viewer versions for users that have the ArcView software, as well as a "Runtime" version of the Data Viewer for does not require ArcView. See below for details on the "Runtime" Viewer.

What the MassGIS Data Viewer Contains

MassGIS Data Viewers are available for a particular region (one town, a few towns, a watershed, etc.) or for the entire state. All Viewer CDs contain the customized ArcView projects explained above.

Custom Regional Viewers include:

- all point, polygon and vector data that overlap the requested region in ARC/INFO Librarian format (except the Natural Heritage and Endangered Species Program data, which are available for download at the MassGIS web site),
- Scanned USGS Topographic Quadrangle Maps,
- Black & White or Color digital orthophotos in MrSID format, (space permitting).

Statewide Viewers include only vector data and are available as a 5-CD set. Images are available separately as sets. See the page on Data and Map Ordering Services for pricing and ordering information.

Enhancements in the Viewer vs. "Regular" ArcView

Some of the enhancements in the MassGIS Data Viewer include:

- A set of menu choices that group the MassGIS datalayers into useful categories. It is easy to find the data you wish to view - the user does not have to know how the data is tiled or where it is stored.
- A set of menu choices for zoom extents so that it is easy to move around the state
- The ability to zoom to a Latitude/Longitude or UTM point
- Default legends and symbolization for datalayers
- The ability to save and name extents so that you can return to them quickly without rezooming
- Built-in documentation on each MassGIS datalayer
- In the full version of the Data Viewer for ArcView, simplified address-matching or geocoding

The Data Viewer does not disable any regular ArcView functions. Some documentation is included for those users who wish to further customize the project and add their own scripts, and more information is available upon request.

PC Specifications for Running the Data Viewer

The Data Viewer requirements are the same as those for ArcView. A minimum of 32MB of RAM is required, but 64 or more is preferred. The more memory the computer has the faster all processing will be. If the Data Viewer comes on one CD the GIS data can be left in the CDROM drive since access to CDROM drives is fast. The GIS data may be copied to the hard drive if desired. When a set of data spans more than one CD, all the data on the CDs

should be copied to the hard drive so that the Data Viewer has access to all datalayers at all times. The full version of the Data Viewer - the ArcView project file and associated tables -use about 5 MB of hard drive space. The "Runtime" version of the Data Viewer program, which must be installed on the hard drive if you do not have a full version of ArcView, uses about 40 MB of hard drive space. The full version of the Data Viewer will run with ArcView on Windows 95/98/NT, or UNIX. It is assumed that it will run with Windows 2000. The runtime Data Viewer requires Windows 95/98/NT or Windows 2000.

"Runtime" Data Viewer

The Runtime Data Viewer is a stand-alone piece of software: a "light," or scaled-down version of ArcView GIS 3.1.1 that offers much of the map-making functionality of the full software package. Included with all versions of the MassGIS Data Viewer CD products, the Runtime Data Viewer lets you display all the MassGIS data, change their symbolization, add symbols and text to the map, create a map layout with map elements such as a scale bar, north arrow, legend and title, and print your layout. The Runtime Data Viewer also gives you the ability to save any finished map layout as a bitmap image, Windows Metafile, or Postscript file, which then may be brought into a variety of other software. The Runtime Data Viewer will not save a project, edit tables, or create shapefiles, so it may not be comprehensive enough for everyone. However, it can be a way to get started with GIS and the datalayers MassGIS offers.

Watershed Analyst

The MassGIS Watershed Analyst is a set of menu choices and tools included in all full versions of the MassGIS Data Viewer. The menu choices and tools can be displayed or hidden, depending on whether you need them. The menu choices and tools deal with various aspects of watershed analysis. The user can trace upstream in the watershed network, place points or lines on the river network, or delineate a watershed from any chosen point, line or polygon. A "raindrop" tool is also available, allowing the user to follow the path of a drop of rain over land. The raindrop tool and tools for watershed delineation require ArcView's Spatial Analyst Extension software version 1.1 or higher and also a MassGIS extension called the MassGIS Watershed Delineator (watdelin.avx). The Watershed Analyst tools may be used in ArcView GIS 3.0a/b, ArcView GIS 3.1, and ArcView GIS 3.2 or 3.2a (UNIX or PC). Visit http://www.state.ma.us/mgis/vwr_wa1.htm for complete documentation on the Watershed Analyst.

Support

Documentation and other Viewer information may be found on the MassGIS Web site. For complete details visit http://www.state.ma.us/mgis/viewer.htm. For more information contact Aleda Freeman at (617) 626-1193 or by e-mail at Aleda.Freeman@state.ma.us. Viewer technical support questions also may be submitted through our Online Technical Support system at http://www.state.ma.us/mgis/vwr_help.htm.

Other Services Offered by MassGIS

Scanning

MassGIS maintains a Tangent CCS 500 50 FT E-size color drum scanner. Scanning services are available on a limited basis for small data conversion projects.

GPS

MassGIS has a number of Global Positioning System (GPS) units available for project use. MassGIS has purchased Trimble GeoExplorer units with a corrected accuracy of 3-5 meters. Training materials and limited technical assistance are provided by MassGIS.

Coordination and Assistance

MassGIS will provide guidance to cities, towns and others interested in learning more about or acquiring GIS technology. MassGIS tracks GIS activities, maintains a library of reference materials on GIS topics, facilitates data development through data exchange agreements, and is available to meet with groups interested in GIS.

DATALAYER DESCRIPTIONS

Overview

MassGIS data can be divided into two broad categories: **base map** data and **environmental** data. As described below, these data have been developed at a variety of scales (see the section Understanding Scale below for a brief description on map scale). The data may also be categorized further, based on types of geographic features, such as infrastructure, physical resources, and political boundaries. This page describes the two broad categories. For descriptions on individual layers see the Available Datalayers page, on which the data are organized within the more-detailed categories. Note that the date below each datalayer description title represents the month and year of that layer's most recent update.

The datum for the MassGIS database is North American Datum 1983 (NAD83). The data are registered to the Massachusetts State Plane Coordinate System, Mainland Zone (Fipszone 2001). Units are meters. (Some imagery for Martha's Vineyard and Nantucket are also available in the Mass. Stateplane Island Zone). The Massachusetts State Plane Coordinate System, Mainland Zone is defined as follows:

```
Projection:             Lambert Conformal Conic
Spheroid:               GRS 80
Central Meridian:       -71.5
Reference Latitude:     41
Standard Parallel 1:    41.71666666667
Standard Parallel 2:    42.68333333333
False Easting:          200000
False Northing:         750000
```

Base Map Data

In its role as a repository for GIS data, MassGIS is responsible for maintaining the "base map" datalayers that commonly appear on many kinds of maps. These datalayers include features such as roads, streams, and political boundaries--relatively permanent, widely used features. Many of the base map datalayers maintained by MassGIS have been derived from U.S. Geological Survey data and represent many of the feature types found on USGS topographic maps. More recently developed data were derived from the digital orthophotos providing improved basemap accuracy.

Several of the MassGIS base map features are available in two scales. So-called "**Quad" scale** datalayers were typically compiled from 1:25,000 scale maps (the scale used on the popular USGS 7.5 minute topographic map quadrangles) and are suitable for spatial analysis of larger areas such as counties or of entire towns. MassGIS is making increasing amounts of **large-scale** data available that is suitable for spatial analysis within towns or of individual parcels of land. Large-scale data have been developed from the EOEA digital orthophotos. This 1:5,000 scale base map is now considered the new state basemap for data. Other datasets have been developed at smaller scales (1:100,000 or 1:250,000). The individual description pages state the layer's scale.

In addition to vector (point/line/area) data, MassGIS also distributes image data, including Black & White Digital Orthophotos, Scanned USGS Quads, and Coastal Color Orthophotos. The imagery is available in Tiff and MrSID formats.

Environmental Data

In addition to base map data, MassGIS distributes datalayers developed by EOEA and its agencies. These datalayers include those developed by the agencies for the purpose of enforcing environmental regulations or in support of various types of environmental analysis. Responsibility for maintaining and updating these datalayers remains with the agencies that produced them, as indicated in the individual descriptions. Many of these datalayers were compiled at "Quad" scale and are suitable for spatial analysis using the MassGIS base map data.

Understanding Scale

Scale is defined as the ratio of the distance measured on a map to that measured on the ground between the same two points, in the same units). Scale is represented on this web site as a ratio, such as 1:25,000 (read "one-to-25,000") which means one inch measured on the map equals 25,000 inches in the real world). Scales are relative: the term "**large scale**" describes data with more detail than "**small scale**" data. For example, data at 1:25,000 is at a smaller scale than data at 1:5,000, but at a larger scale than data at 1:100,000. In other words, the larger the ratio, the smaller the map scale. Therefore, a map of the world would have a very small scale, whereas a map of a town center will have a large scale.

GIS data can be displayed at any scale, but disregarding the scale of the source material can create problems. For example, if contour lines compiled at the very small scale of 1:250,000 are displayed at 1:25,000 with water resource features developed at much larger scale of 1:25,000, contour lines will appear to cross lakes and ponds --an obvious error. GIS data should not be displayed beyond the accuracy at which the data was developed.

Current Data Initiatives

One of the most important functions of the MassGIS staff is to maintain and expand the digital database. Spatial data are constantly changing and new data sources become available. The following section describes active data development projects. For the most current status on these and other projects, please refer to the status maps on the MassGIS Web site at http://www.state.ma.us/mgis/maps.htm.

- **Soils:** A soils datalayer has been automated from the USDA Natural Resources Conservation Service (NRCS) 1:25,000 published soil surveys. All soils data released by MassGIS have been "SSURGO-certified," which means they have been reviewed and approved by the NRCS and meet all standards and requirements for inclusion in the national release of county-level digital soils data. Soils data are currently avaialable for Norfolk and Suffolk counties, Hampden/Hampshire East, Hampden/Hampshire West, and Berkshire County. This datalayer will be under development until complete coverage exists across the state. Work is now underway in parts of Worcester, Bristol, Middlesex, Plymouth, and Franklin Counties, using soils surveys updated and/or recompiled onto 12:000 USGS orthophotography. See http://www.state.ma.us/mgis/st_soi.htm.

- **1:5,000 Orthophoto Wetlands:** Complete coverage is now available for Cape Cod, metropolitan Boston and the North Shore, parts of the South Shore and Buzzards Bay Watershed, along with parts of the Quabbin-Ware-Wachuset Waterhsed district. Development by the DEP GIS Group is continuing, with southeastern Massachusetts the current priority region. See http://www.state.ma.us/mgis/st_wet.htm.

- **1:5,000 Statewide Digital Orthophotography:** As of March 2000, MassGIS has full statewide coverage for the 1:5,000 black and white Digital Orthophotography datalayer. With some of the original photography captured more than eight years ago, the next phase in this project will be to update areas covered by these

older photos. A timeframe for beginning this phase is yet to be determined. See http://www.state.ma.us/mgis/st_oq.htm.

- **1:5,000 3-Meter Contours:** With the statewide orthophotography program complete, the related elevation data are in the final phases of processing and quality control. Currently the western and south-central regions need to be completed for the Contours, Breaklines, and Elevation Points layers. Estimated date of completion is March 2001. See http://www.state.ma.us/mgis/st_hp.htm.

- **Stream Network Centerlines:** Work is underway to complete a single-line centerline network on the 1:25,000 hydrography. True single-line features (such as streams or canals) are supplemented by GRID-derived centerlines which flow through polygon features (ponds, wetlands, doublewide streams, etc). This network representation of basins allows for analysis and querying to answer upstream/downstream and other hydrologic or basin-oriented questions. A route-system will be in place on the network with complete coding of the existing SARIS coding scheme. See http://www.state.ma.us/mgis/st_wa.htm.

- **Municipal Zoning:** MassGIS is collecting and compiling municipal zoning districts and bylaws. MassGIS has collected zoning coverages developed by the Executive Office of Transportation and Construction (EOTC), the Regional Planning Agencies, and the Essex County Registry of Deeds. Others were digitized at MassGIS using town zoning maps and, where available, the 1:5,000 digital orthophotos. Unique municipal zoning codes have been preserved and a regional zoning attribute scheme was developed to facilitate regional analysis. Data scale and accuracy are variable. Currently MassGIS is receiving data for many communities through EOEA's Buildout Analysis Program in conjunction with its Community Preservation Initiative.

- **Land Use:** The University of Massachusetts at Amherst, under contract by EOEA, is developing complete statewide Land Use using aerial color infrared photography flown in the summer of 1999. Following extensive quality control and review, MassGIS will make the data available on a town-by-town basis as they are completed, beginning in late 2000. Project completion is expected by December 2001.

- **Protected and Recreational Open Space:** Though the original data-development phase of this project is complete, MassGIS continues to receive updates of Open Space data from regional planning agencies and municipalities, as well as by way of EOEA's Buildout Analysis/Community Preservation Initiative.

- **1:5,000 Roads:** During the development of the 1:5,000 Orthophotography program, road centerlines were captured statewide from the original half-meter 3D stereo models. MassGIS is currently in the initial stages of a "conflation" process – attaching the attributes from the Massachusetts Highway Department Roads Inventory File to the new unattributed ortho-scale linework. Upon completion, MHD will use the "conflated" linework for all its future data updates and the "5k Roads" layer will be the default release of street data by MassGIS.

- **Municipal Boundaries:** Based on survey-control monument data recorded in historical atlases located at the Massachusetts Highway Department, this new datalayer will replace the current "TOWNS" and "BOUNDARIES" layers. Town corners were recorded, in most cases, in Latitude-Longitude coordinates precise to 1/1000 of a second.

MassGIS is continually working on its database, adding new datalayers and updating exiting ones. Some layers, like the DEP Zone IIs, IWPAs and Public Water Supplies are updated on a fairly regular schedule, approximately every three or four months. Others, like Areas of Critical Environmental Concern, are updated as new features are added. New datalayers also are brought online on an irregular basis. For the most up-to-date information on new layers and other data changes, please see http://www.state.ma.us/mgis/whatsnew.htm.

Basic Librarian Concepts

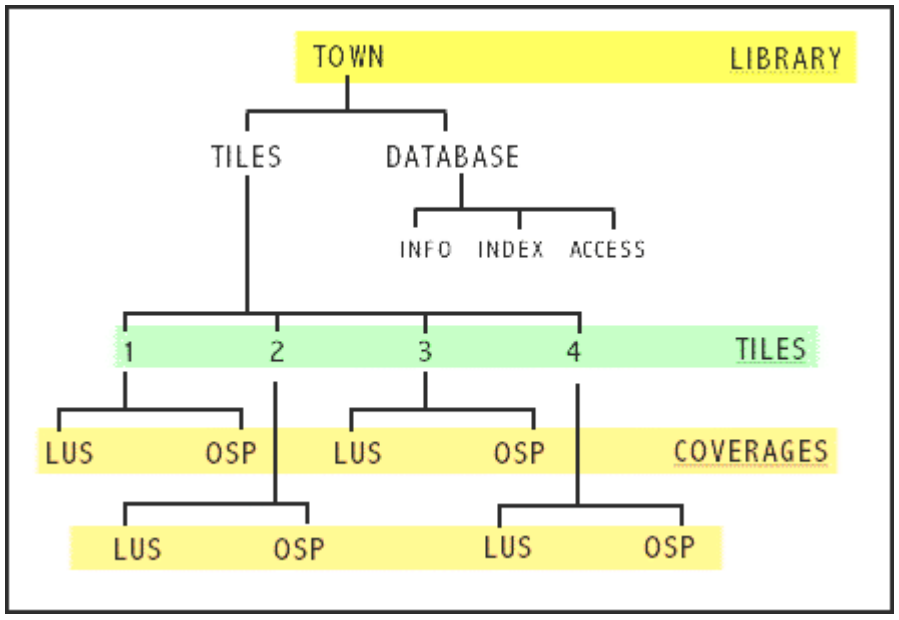
Storing Data in Librarian

For those users of MassGIS data who have elected to obtain the MassGIS Data Viewer, the accompanying data are distributed as ARC/INFO coverages, stored in ARC/INFO's Librarian format. Data libraries (sometimes called map libraries) are much like a traditional library in the sense that they both serve to store information in manageable pieces in an organized way. In a library of books, the books may be organized by topic (i.e. history, biography), divided into volumes and arranged on shelves for easy and rapid retrieval of information. The geographic data in MassGIS' libraries are organized by the way the layers are broken up into manageable pieces, called tiles. GIS data can often be large, and it is easier to work with smaller tiles rather than one statewide layer. Each library has a name, based on its tiling scheme. MassGIS tiles its data in the following ways:

- by quad (each USGS Quad represents a tile) - the "QUAD" and "QUAD2" libraries
- by town (each municipality represents a tile) - the "TOWN" library
- by basin (each basin represents a tile) - the "BASIN" library
- by watershed (each watershed represents a tile) - the "WATRSHED" and "WATRSHD2" libraries
- by Orthophoto Quad (each orthophoto quad represents a tile) - the "OQ" library

Some layers are small enough to use as one single statewide coverage. These layers are considered to be "tiled by the state" and are thus found in the "STATE" library. In addition, MassGIS maintains data that extend beyond the state boundary, such as the towns of the adjacent New England states; these layers are in a library known as "NE" - short for Northeast.

Unlike a book library, however, in which you access information one volume at a time, a digital map library allows you to access all the data in it as a whole, all at once, when using ARC/INFO or ArcView. Such a scheme simplifies data storage and data access by eliminating the need to know where data are stored in order to use them. In addition, data in Librarian format ensures attribute consistency across a datalayer. Librarian also allows the user to easily extract coverages from a library (i.e. "clipping out a chunk of data") by user-defined boundaries. For example, Landuse is tiled by town, but Librarian allows the user to extract a single coverage of landuse comprising several tiles by the user-supplied boundary of a river basin.



As illustrated in the graphic above, the libraries and tiling schemes correspond to the way the data files are physically stored in a computer or on media (such as a CD or tape). Each tile is a subdirectory within the appropriate library directory. The data, or coverages, are found under each tile. For example, in the Town library, the Landuse, Open Space, and TIGER Roads layers (coverages named LUS, OS, and TIG, respectively) are tiled by the town unit and stored under each town's tile directory. In the example above, the tile numbers represent unique town IDs. This reinforces the principle that data in a library are paneled **not** by datalayer, but by tile. Within a library, the coverages of a particular datalayer all have the same name in each tile directory. Hence, a layer has only one coverage name. Each library has a set of datalayers and corresponding coverage names.

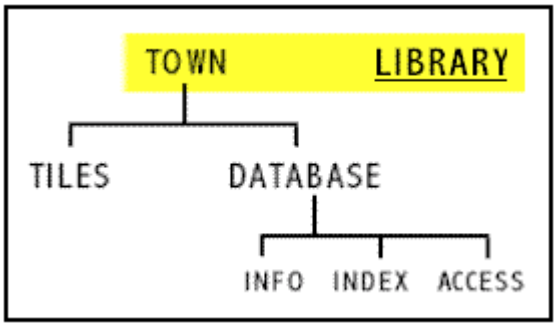
For the Town library, for example:

Layer Name	Coverage
LANDUSE	lus
OPENSPACE	osp
TIGER	tig

Please see the **MassGIS Library Scheme** on the following page for a complete listing of all the MassGIS libraries and the layers and coverages each contains.

The "Database" Directory

Parallel to the tile directory structure is the DATABASE directory for each library. Information about the library and its layers is found here.



The index polygon coverage (always called Index), upon which the library tiling scheme is based, is kept in DATABASE. User access to the library and layers of the library are controlled here in the Access subdirectory. Though not illustrated in the diagram, template coverages are also stored in this directory. Template coverages are empty coverages for each layer which Librarian uses to store layer parameters (attribute items, item definitions, etc.). As part of these empty template coverages, the user will find all metadata files for the associated layers. The metadata explains all coding schemes, identifies data sources and provides all necessary information about the data. A full explanation of the naming conventions and related information about metadata may be found in the page titled "Standards for Documentation of GIS Coverages, Tables, Datalayers."

Below is one record of the INDEX.pat. The status of each layer and the location of each layer's tiles are attributes of the index coverage. The item LOCATION provides the path to the tile of a layer while TILE-NAME stores the name of the tile. The status of each layer is also stored in the Index. In the example below, TIGER, LANDUSE and OPENSPACE are attributes to the Index coverage representing each layer. For every tile where data are available, the layer status is coded P (present). If no data are available for the tile, the item is coded N (not present). Coding for status allows quick queries of data availability for a layer.

Sample Record of INDEX.pat:

```
AREA           = ************
PERIMETER      = 46813.086
INDEX#         = 12
INDEX-ID       = 21
TILE-NAME      = 341
LOCATION       = $TOWN/tiles/341
TOWN-ID        = 341
TOWN           = WILLIAMSTOWN
TIGER          = P
LANDUSE        = P
OPENSPACE      = P
```

MassGIS Library Scheme

Library	Layer	Coverage	What is it?
TOWN	LANDUSE	LUS	Land Use – 1971/85/90/91/92/95/97/99
	OPENSPACE	OSP	Open Space
	TIGER	TIG	Census Tiger Lines (Roads)
QUAD	COAST	CS	1:25,000 Coastline
	GEONAMES	GNM	Geographic Place Names
	HYDRO	HD	1:25,000 USGS Hydrography
	MHDROADS	MRD	Mass. Highway Dept. Roads
	Q3FLOOD	Q3	FEMA Flood Data
	T5	T5	Title 5 Setback Areas
QUAD2	NWI	NWI	National Wetlands Inventory
	SOILS	SOI	Soil Types
	SOILSPOT	SPO	Soil Spot Features
	ZONING	ZN	Municipal Zoning Districts
	ZONINGOV	OV	Zoning Overlay Districts
BASIN	AQUIFERS	AQ	Aquifers
	CONTOURS250	HP250K	1:250,000 Topographic Contours
	HD100	HD100_	1:100,000 Hydrography
	SUB_BASINS	SUBBAS	Sub-basin Boundaries
WATRSHED	NETWRK	CL_	Networked Hydro Centerlines
WATRSHD2	NAT-COR	NATC	Natural Land Riparian Corridors
	NATLANDS	NATL	Contiguous Natural Lands
	RIP-COR	RIPC	Riparian Corridors
	SURF_GEOLOGY	SG	Surficial Geology
OQ	ANNO_OQ	AN	Orthophoto Annotation
	CONTOURS	HP	Orthophoto 3-meter Contours
	STREAMS	S	Orthophoto 1:5,000 Streams
	WETLANDS	W	Orthophoto 1:5,000 Wetlands
OQE	BREAKLINES	L	Orthophoto Breaklines
	ELEVATIONS	P	Ortho Point Elevations
EOEAONLY	CVP9901	CVP9901	NHESP Certified Vernal Pools
	PHAB9901	PHAB9901	NHESP Priority Sites – Rare Species Habitats
	WHAB9901	WHAB9901	NHESP Estimated Habitats of Rare Wildlife
NE	ANADFISH	ANADFISH	Anadromous Fish
	ATLNPROV	ATLNPROV	Atlantic Provinces
	BATHYMGM	BATHYMGM	Bathymetry for the Gulf of Maine
	BTHOS250	BTHOS250	Offshore Bathymetry (1:250,000)
	CTTOWNS	CTTOWNS	Connecticut Towns
	DSGA	DSGA	Designated Shellfish Growing Areas
	GEONAMES	GEONAMES	Geographic Annotation
	GRID10K	GRID10K	MA Stateplane Grid and Points
	LOB-HARV	LOB-HARV	Lobster Harvest Zones
	METOWNS	METOWNS	Maine Towns
	MINLL1	MINLL1	One-Minute Latitude/Longitude Grid
	MINLL10	MINLL10	Ten-Minute Latitude/Longitude Grid
	NAUTICAL	NAUTICAL	NOAA Chart Major Linework
	NEWENGLAND	NEWNGLND	NE States
	NE_MASK	NE_MASK	States Bordering Mass.
	NHTOWNS	NHTOWNS	New Hampshire Towns
	NOAAINDX	NOAAINDX	NOAA Nautical Chart Image Index
	NYTOWNS	NYTOWNS	New York Towns
	OCEANMSK	OCEANMSK	Ocean Mask around New England
	OFFSH80K	OFFSH80K	Offshore Town Boundaries
	RITOWNS	RITOWNS	Rhode Island Towns
	SANCTUARY	SANCT	Federal & State Marine Sanctuaries
	SEA_MASK	SEA_MASK	Ocean Off Mass. Coast
	SHLFSHST	SHLFSHST	Shellfish Sampling Stations
	VTTOWNS	VTTOWNS	Vermont Towns
STATE	AB_CRAN	AB_CRAN	Abandoned Cranberry Bogs
	ACECS	ACECS	Areas of Critical Environ. Concern
	AQUEDUCTS	AQUEDUCT	Aqueducts
	AQ_SOLE	AQ_SOLE	Sole Source Aquifers
	BARRIERB	BARRIERB	Barrier Beaches
	BOUNDARY	BOUNDARY	Municipal Boundaries (no coast)
	BWPMAJOR	BWP_MAJ	DEP BWP Major Facilities
	C21E	BWSC_DEP	DEP Tier Classified Chapter 21E Sites
	CANOEACCESS	RIVRECPT	Canoe Access Points
	CANOETRIPS	RIVTRIP	Canoe Trips
	CBRS	CBRS	Coastal Barrier Resource Units
	CIR93	CIR93	Color Infrared Flight Lines
	CONGRESS	CONGRESS	Congressional Districts
	COQMAIN	COQMAIN	Color Coastal Orthophoto Index

STATE (cont.)	COUNTIES	COUNTIES	Counties
	COUNTYNC	COUNTYNC	Counties (no coast)
	CSTZONE	CSTZONE	Mass. Coastal Zone
	CZMSHEET	CZMSHEET	CZM Sheet Index
	DCSITE98	DCSITE98	USGS Data Collection Stations
	DWM_STATIONS	DWM_STAT	DEP Water Monitoring Stations
	ECO_REGIONS	ECO-REG	US EPA Ecoregions
	EELGRASS	EELGRASS	DEP Eelgrass
	EGRASVPT	EGRASVPT	DEP Eelgrass Field Verified Points
	EXITS	EXITS	Highway Exit Locations
	FISH-TRP	FISH-TRP	Fish Trap (Weir) Locations
	FIRMAOV	FIRMAOV	FEMA FIRM Zones V and AO
	GAGES94	GAGES94	Stream-Gaging Stations
	GWP	GWP	Ground Water Discharge Points
	HOUSE93	HOUSE93	House Districts
	IWPA	IWPA	Interim Wellhead Protection Areas
	IWPACOM	IWPACOM	IWPA for Community Wells
	LANDMARK	LANDMARK	Landmarks
	LDTRAILS	LDTRAILS	Long Distance Trails
	LUSTAT	LUSTAT	Year of Land Use
	MAJ_BAS	MAJ_BAS	Major Basin Boundaries
	MAJ_POND	MAJ_POND	Major Ponds
	MAJ_RD_MHD	MAJRMHD	Major Roads (from Mass Hwy Dept)
	MAJ_STRM	MAJ_STRM	Major Streams
	MBTA	MBTA	MBTA Rapid Transit
	MHDRDPTS	MHDRDPTS	Points for plotting road shields
	NPDWSACC	NPDWSACC	Cape Non-Pot. Drinking Water Areas
	OQISLE	OQISLE	OQ Index - Islands
	OQMAIN	OQMAIN	OQ Index - Mainland
	ORW	ORW	Outstanding Resource Waters
	OUTLINE	OUTLINE	State Outline (100k coast)
	OUTLINE25	OUTLN25	State Outline (25k coast)
	PAB	PAB	Public Access Boards
	PVP	PVP	NHESP Potential Vernal Pools
	PWS_DEP	PWS_DEP	Public Water Supplies
	QUADS	QUADS	Quadrangle Sheets
	RAILTRAILS	RAILTR	Rail Trails
	REG_DEM	REG_DEM	DEM Regions
	REG_DEP	REG_DEP	DEP Regions
	RPAS	RPAS	Regional Planning Authorities
	SCEN-INV	SCEN-INV	Scenic Landscapes
	SENATE93	SENATE93	Senate Districts
	SMRESTOR	SMRESTOR	Salt Marsh Restoration Sites
	SOILINDEX	SOILINDX	Soil Survey Sheet Index
	SOILSTAT	SOILSTAT	Soil Status Index
	SRHP[1-4,PT]	SRHP[1-4,PT]	State Register of Historic Places
	STELLBNK	STELLBNK	Stellwagen Bank Sanctuary
	SW	SW	Solid Waste Facilities
	TIDALRST	TIDALRST	Tidal Restrictions
	TOWNS	TOWNS	Town Boundaries (with coast)
	TRAINS	TRAINS	Trains
	TRANSLINES	TRNSLNS	Transmission Lines
	USGSGRID	USGSGRID	Digital Quadrangle Sheets
	UST	UST	Underground Storage Tanks
	UTMGRID	UTMGRID	UTM Grid
	UTMPOINT	UTMPOINT	UTM Points
	WATRSHDS	WATRSHDS	Major Watersheds
	WQM_STAT	WQM_STAT	Water Quality Monitoring Stations
	ZONEA / B / C	ZONEA / B / C	Zone A, Zone B, Zone C Surface Water Areas (3 layers)
	ZONE_IIS	ZONE_IIS	DEP Approved Zone Iis

Standard for Documentation of GIS Coverages, Tables, Datalayers

Overview and Objectives

This section presents standards and guidelines for complete documentation of GIS data within the MassGIS library. It provides for documentation of GIS data at various levels - globally for entire thematic layers, by individual coverage or by individual feature where data layers are derived from heterogeneous source material, as are open space data. The standard provides a structure for traditional data dictionary elements - definitions of attribute table items, listings of codes used, and other information that will make it possible for any user to access and use unfamiliar data. It also provides for a consistent approach to symbolization and for the documentation of links to related data files, both for geographic and for tabular data. Finally, the standard addresses the need to record the coincidence of geographic features, e.g. where a boundary is coincident with a road or a land-use category is coincident with a natural feature such as a riverbank. In this way, dissimilar scales can be reconciled without recourse to the original material when better quality basemap information becomes available.

Key Concepts and Definitions

A comprehensive and sustainable approach to the documentation of GIS data requires using a relational database framework in which it is possible to join the feature attribute tables to various meta-data tables. The approach presented here is based on the relational database contained in the ARC/INFO product, which is INFO. It can be implemented in any database system. The following definitions may be helpful for those not familiar with ARC/INFO GIS terms:

feature — A feature is the basic unit of ARC/INFO data. Features include **geographic features,** the familiar geometric abstractions of point, line and polygon representing the positions and boundaries in the real world of such entities as wells, rivers or parcels. **Records** in an INFO database **table**, not linked to geographic features, can still be manipulated by the same software commands in ARC/INFO and are also referred to as features in this standard.

feature attribute table — A feature attribute table is a particular type of table in an INFO database, which stores descriptive information linked to geographic features by unique IDs. The one-to-one correspondence between features and records in the feature attribute table is a key element of the data model - the unique identifier in the feature attribute record is the link to any other data which may be in a one-to-many relationship with the feature.

INFO table — An INFO table is a set of records with specific units of information stored in discrete fields with pre-defined data-types and format, just as records are stored in any relational database.

coverage — A coverage is a collection of geographic features and associated attribute information, analogous to a table in a database; it consists of a set of files describing topological and coordinate information for geographic features which are stored in a single coverage sub-directory and additional attribute files in INFO sub-directory. Attribute information may also be stored in other databases such as Oracle.

workspace A workspace is a system directory where GIS data may be stored (and formatted to contain at a minimum an INFO subdirectory) and in which feature attribute information for any ARC/INFO geo-datasets (coverages, grids, or tins) in that system directory is managed.

layer A layer is a single coverage or group of coverages with common thematic content. If there is more than one coverage in a data layer, then all coverages must:

1) represent the same kind of data
2) have common naming convention
3) be indexed by one single coverage (see below)
4) contain identical feature types and attribute tables which use **one consistent, unique set of code values**
5) have common units, projection and datum
6) have one responsible data layer manager

index An index coverage is a special ARC/INFO polygon coverage used to divide layers into manageable geographic sub-units called **tiles** - this is required by ARC/INFO processing constraints. Each polygon in the index coverage has the same geographic extent as a single tile in the set of coverages being indexed. The whole index coverage has the extent of the entire set of coverages which make up the data layer. Every polygon of the index coverage has a unique code which may be used in the naming convention for the directories in which individual coverages are stored. Many layers may be indexed by a single coverage.

relate A relationship between tables, more commonly known as a **join,** which is based on a common field. The parameters of such a relationship are stored in an ARC/INFO relate file.

Layer/Coverage/Table Documentation

MassGIS has developed a standard documentation progam (coverdoc.AML) to produce metadata for datalayers, coverages, or INFO tables. The result of the program is a documentation file or ".doc" file for each datalayer, coverage, or INFO table. The .doc file will be associated with the layer, coverage or table by having the same root name with the .doc extension. For example, if the layer code (see explanation below) is "LUS", then this file will be "LUS.DOC." When dealing with a single coverage rather than a layer, then the file will include the covername as the root - for example, "QUADS.DOC" will be the documentation file for the coverage "QUADS." When dealing with a stand-alone INFO file, not linked to a coverage, then the file will reference the name of the INFO table, with the period changed to an underscore if the INFO file has an extension. For example, if the INFO table is "CENSUS.LUT", then the documentation file will be "CENSUS_LUT.DOC." The format of the **layer/cover/table documentation** is decribed below. Because MassGIS stores data in librarian format, the explanation below describes only layers. Other users may run this program to document layers, coverages, or tables. The item names in the .doc file will remain the same (see below), however they will describe the structure of the data, be it a coverage or a table, so simply substitue the word "coverage" or "table" for "layer" in the following descriptions. The list below describes the items found in the .doc file:

LY_CODE **Layer Code:** The layer code is the abbreviated code for the layer which is used for all the individual coverage "tiles" in that layer, which are stored in the ARC/INFO Librarian data structure. For example, the hydrography derived from the USGS 25k scale topo sheets has a layer code of "hd." The coverage for quad number 135 will be stored in a directory for that tile. On export, the file will be named "hd135.e00" so that it can be

referenced as a single coverage by the end-user outside of EOEA. In order to accommodate the 8 character limitations of the DOS file-naming convention, the layer/coverage codes should typically be limited to 5 characters which will allow for 3 index id characters in the export file. If the code and index are both alpha, then there should be an underscore between them.

LY_NAME	**Layer Name**: the full name of the data layer or individual coverage. For example, "25k scale hydrography" or "soils" or "land use."
LY_PRODST	**Layer Production Status:** Code for the status of the layer or coverage (D = under development, P = final production status).
LY_SRC	**Layer Source:** General description of the source, although in most cases more detailed information should be entered into **feature source** (.fsc) table.LY_PRJ
	Layer Projection: The projection for the layer/cover (also entered in .fsc table, entered here for easy reference.)
LY_AUTO	**Layer Automation:** General description of the automation method.
LY_KEYWDS	**Layer Keywords:** should include all commonly used terms associated with the layer or cover - synonyms or related descriptive words which might be used in a keyword search for the data by anyone who was not familiar with its exact nomenclature.
LY_DESC1	**Layer Description 1:** The description of the layer or cover - a short, textual description of the data set, including some reference to the source(s), the processing methodology and other information which might help the casual user decide whether or not the data are appropriate to her use.
LY_DESC2	**Layer Description 2:** Additional room for the layer or cover description.
LY_REPMODL	**Layer Representation Model:** a description of the type of features mapped, whether raster or vector for digital data, or hardcopy for non-digital data. For raster data sets, the cell size will be recorded here, e.g. ".5 meter cell." For vector data, possible choices might include "line," "network," "point," or "area."
LY_USE	**Layer Use:** a description of the intended use of the layer/cover which will provide a general characterization of the accuracy and reliability of the data. However, more complete information about currency, accuracy and completeness of the data will be found at the coverage level.
LY_UNITS	**Layer Units:** The map units for all coverages in the data layer or for the cover.
LY_PROG1	**Layer Program 1:** The name of the program which is currently managing the data set particularly if there is a commitment to updating it.
LY_PROG2	**Layer Program 2:** The name of other programs is currently co-managing the data set if developed by multiple programs, particularly if there is a commitment to updating it.
LY_MGR	**Layer Manager:** the individual who is most directly responsible for managing the data layer/cover and most familiar with it.
LY_AGENCY	**Layer Agency:** the agency that is the official manager of the data set, and responsible for its contents.
LY_DISTMGR	**Layer Distribution Manager:** the program that is responsible for distributing the data. This is NOT necessarily the same as the layer agency.
LY_PREC	**Layer Coordinate Precision:** a choice of either single (8 significant figures) or double (15 significant figures).
LY_DISTST	**Layer Distribution Status:** restrictions on distribution. For MassGIS or other Massachusetts state agency data restrictions will be limited to legally sanctioned exemptions under FOI but may be applied to other data supplied by outside agencies or private concerns.
LY_EXPTFEE	**Layer Export Fee:** Obsolete. Data no longer sold by layer.
LY_INDXCOV	**Layer Index Coverage:** the full pathname of the index coverage.
LY_COMM1	**Layer Comments 1:** This is a memo field for any additional information that may be pertinent to use of the data.
LY_COMM2	**Layer Comments 2:** Additional room for information that may be pertinent to use of the data.
LY_COMM3	**Layer Comments 3:** Additional room for information that may be pertinent to use of the data.

LAST_MOD **Last Modification Date:** This records the date of the meta-data (not the date that the data were modified, but the date that the meta-data entry itself was last modified).

Feature Attributes, INFO tables and Related Documentation

In addition to the institutional and global "layer/cover" attributes listed above, the standard supplements the data dictionary functions built into INFO for the feature attribute and non-coverage related INFO tables, especially in a diverse, multi-user environment. This means that for each kind of feature attribute table or other INFO table the standard requires various associated files for documentation. The first is a file that defines and describes the item names. This file is an extension of the default INFO item listing. The format for this file, the **feature attribute description** table, (note that "feature" is being used to include INFO records), is as follows:

item_name	name of the item
item_desc	description of item
item_width	width of item in bytes
item_output_width	output width in bytes
item_type	data type
item_dec	number of decimal places
item_min	minimum allowable value
item_max	maximum allowable value
item_units	units of measure, if appropriate
item_update_freq	frequency of update
item_code_value	y/n flag to indicate use of code values
dict_last_mod	Records the date of the meta-data entry (not the date that the data were modified, but the date that the meta-data entry itself was last modified)

Note that the first 6 items are already stored in INFO, so this table can be populated easily.

Note that the item_name here and elsewhere can refer to an item in a related table. As mentioned above, the parameters of the relate are stored in a standard ARC/INFO table. The related item is referenced using the format **relate_name//item_name.** The format of the standard table to describe the relate is as follows:

relate_name	Name of the relate used in item_name
table-id	table to which feature attribute table is related
database	Database in which related table is stored
item_name	Item in the feature attribute table
column	Item in the related table
type	Identifies the type of index if any in related table
access	Type of security on related table

Additionally, the standard provides an explanation for the use of codes in the feature attribute tables - storing this information in related INFO tables, commonly called "lookup tables" is good practice in that it enables the display of intelligible descriptive information as labeltext for example, without excessive data storage requirements. These **feature attribute code** tables have the following format:

item_name	name of item
item_value_c	character field containing all valid values for that item when the item is of a character type.
item_value_i	integer field containing valid values for that item when the item is of an integer type.
item_value_desc	description of value
dict_last_mod	Records the date of the meta-data entry (not the date that the data were modified, but the date that the meta-data entry itself was last modified.)

The standard also documents the development and use of annotation in a geographic coverage. This is done with an **annotation** table which stores information about the various levels of annotation in an ARC/INFO coverage.

anno_level	level of annotation
anno_textset	full path of textset used to create anno
anno_symbol	symbol used to create annotation
anno_comment	comments on the creation or use of anno

Finally, the standard documents source attributes of individual features if the coverages are heterogeneous, i.e. if the features are derived from a variety of sources. (Note that this may not be appropriate or necessary - see discussion of other types of source documentation below.) Feature level source documentation is provided by the addition of a field "src" for source to the attribute table, which will contain code values referencing individual source listings for each feature type. The values of this item are described in a **feature source** table (.fsc extension) with the following format:

source_code	unique code for source
source_name	name of cover source
source_type	type of source (gps,map,cad,etc)
source_projection	projection of source material
source_scale	approx. scale of cover source
source_date	date of field conditions/publication (earlier of these if both known)
source_date_rev	source latest revision date
source_contact	contact name
src_agency	unique code for agency source
source_description	description of source
feat_resolution	minimum size of feature/pixel size
feat_comp_base	basemap onto which source was compiled
feat_comp_base_scl	compilation basemap scale
feat_horiz_accuracy	estimated horiz feature accuracy as a function of source and additional processing
feat_vert_accuracy	estimated vertical feature accuracy
dict_last_mod	Records the date of the meta-data entry (not the date that the data were modified, but the date that the meta-data entry itself was last modified.)

Just as geographic data have a source and a processing history with an associated accuracy, so do attributes need to have their source and the method by which they were determined clearly documented for users unfamiliar with the data to be able to use them effectively. To do this, all attributes have a corresponding "<item>_src" field containing source codes, which relates to a **feature attribute source** table with the following format:

item_src_code	code for attribute source
item_src	descriptive name of item source
item_src_contact	name/phone of contact if different than cover
item_src_type	type of source, such as map, photograph, CAD file, etc.
item_src_date	date of measurement, publication, or classification
item_src_agency	agency if different than cover
item_meas_meth	how attribute measured
item_accuracy	estimated attribute accuracy

Finally, as noted above, it may be appropriate to document the processing history or the source at other levels, on either a per tile or per coverage basis. When a heterogeneous datalayer is being developed on a per tile basis, there may be a different source and/or processing history for individual tiles. For example,

town tiles of zoning will have a variety of local sources, some of which may be automated by scanning, others by conversion from CAD, others by compilation. Each of these sources and methods will have associated accuracy ranges for the final GIS product. In this case, the source and accuracy information needs to be presented in relation to the index coverage for the layer/coverage and can be stored in just one file rather than with every feature attribute table. The src item gets moved to a single layerwide table, called the **feature index** table.

This table has the following fields:

tile_name	Name of the index coverage tile as stored in Librarian, eg 105 for quad no. 105
doc_code	Unique code for the documentation of this tile
source_code	Unique code for the source for this tile

The lookup tables for the above doc and source codes are the same as the documentation and source tables listed above with reference to the doc and source code items in those tables. The same structure can be duplicated for the attribute source documentation as outlined above - the “item_source” field becomes the “item_source” table with a lookup either per tile or globally.

It is often useful to know about the theoretical coincidence of coverage features with basemap features (e.g. the coincidence of open-space parcel boundaries with roads) in order to effectively maintain data through a series of basemap upgrades. This is done with a few standard codes to represent coincidence in a "cn" field added to the feature attribute table.

cn_code	code for coincidence of feature with basemap layer
cn_layer	layer name for the coincident feature type, eg. "roads"

Naming Conventions for File Types

What follows is a review of the naming conventions for the above set of files, which will ensure that the feature attribute, source and coding documentation can be extracted in an automated fashion. In all cases, the cover/layer name with a standard set of file extensions will be used to identify the meta data files. For ease of use, the file extension will be composed of two parts. The first part will specify the feature and optionally the subclass of feature. In all cases the first character will identify the **feature type.** The second part will identify the type of metadata file.

The feature types are coded as follows:

p poly or label point
n node
a arc
v grid
I info
r route (see note on subclass below for route, section and region types)
s section “
g region “

Using these codes, the metadata file types will be named as follows:

feature attribute description	<cover/layer>.<feature_type>ad
attribute code description tables	<cover/layer>.<feature_type>ac
feature source tables	<cover/layer>.<feature_type>sc
feature attribute source table	<cover/layer>.<feature_type>as
feature index source/doc table	<cover/layer>.<feature_type>xs
feature attribute relates	<cover/layer>.<feature_type>rl
feature symbolization table	<cover/layer>.<feature_type>sy
feature symbolization options table	<cover/layer>.<feautre_type>so

annotation description table	<cover/layer>.ann

Note that where a feature type has multiple subclasses or instances, as for example when there are different routesystems, <feature _type> will include the subclass name. For example, the route attribute description table for the bus subclass of the rds coverage will be given the name rds.rbusad. These standard files, and the "src" and "cn" items, will comprise the minimum standard for documentation of GIS data.

Additional File Naming Conventions

There are some guidelines for naming intermediate coverages that may also be useful. Successive coverages should be numbered as above with a <_n> after the covername. Additional qualifying information should be included in a similar fashion, such as <cover>_cl for a cleaned version, <cover>_83m for 83 meters. In general, the guideline is to have the layer or cover identifier first, then the code or qualifier second in the root file name, and standardize on the file extension. This will facilitate recognizing the origin or affiliation of the files in question.

One other standard file type whose use is recommended is a user-created table to record symbolization of features containing item names, item values, symbol numbers and specifying shadeset as well. Symbolization must be done using an AML to reselect records from this info table for the specific item and if necessary for the type of symbolization such as aggregated values, black and white, different output devices and so on. These **feature symbolization** files have the following format:

item_name	name of item to be used for symbol look-up
item_value_c	character field containing valid item values.
item_value_i	integer field containing valid item values
symbol_option	user-defined code to allow choice of symbol according to specific
symbolset	name of the symbolset to be used
symbol	symbol number
symbol_name	name of symbol, e.g. colorname
symbol_comment	comment on the symbol choice

The advantage of these files is that users unfamiliar with a given data layer can quickly use the pre-defined themes to effectively display the data.

To simplify selection of the different symbolization schemes, the options are summarized in a **feature symbolization options** file. By listing this table, the user may quickly select the desired scheme for representing features. The options file has the following format:

num_symbols	number of different symbols used in the option to represent data
symbol_option	user-defined code to allow choice of symbol according to specific mapping requirement, output device, etc.
symbolset	name of the symbolset to be used
item_name	name of item to be used for symbol look-up
desc	description of the symbol option
author	person/agency who created the symbol option
last_mod_date	date the symbol option was created or last modified

1:5000 Scale Black and White Digital Orthophoto Images
March 2000

OVERVIEW

These medium resolution images are considered the "basemap" for the Commonwealth by MassGIS and the Executive Office of Environmental Affairs (EOEA). As of March 31, 2000, the entire state is available.

There are five kinds of data associated with this project. The first is the digital black and white orthophotos themselves, available in four resolutions (half-, 1-, 2- and 5-meter). The second is 3-meter contours generated from digital terrain models (DTMs) developed as part of the production process for the orthophotos. The third and fourth are point elevation coverages and breaklines, produced during the 3-meter contour generation process. The fifth is annotation based on the USGS GEONAMES datalayer (see individual description pages for details regarding these four data layers). All of these layers are tiled with the 4000 x 4000 meter NAD83 Orthophoto Index Grid. The naming convention for these layers as exported includes the ID of the index grid sheet prefixed by an "hp" for contour, a "p" for points, an "l" for breaklines, or an "an" for annotation. The half-meter images use only the ID of the index grid sheet for a file name; the other resolutions use "1_", "2_", and "5_" followed by the index ID. The Grid ID is the first 3 digits of the xy coordinate pair for the lower right corner of each cell.

MassGIS has developed an “Orthophoto Viewer” that allows seamless viewing of all the images in the state. See http://www.state.ma.us/mgis/mapping.htm for details. The Massachusetts Institute of Technology has developed a Digital Orthophoto Browser. Through this Web interface you may view a set of Boston area digital orthophotos at several different zoom levels, with pan, zoom, and download functionality. Its Web address is http://ortho.mit.edu.

PRODUCTION

Stereoscopic aerial photography with 80% forward and 40% side overlap was collected along flight lines running approximately north/south during spring "leaves off" periods at a flying height of 15,000 ft. with a 6 inch mapping camera with forward motion compensation. The scale of the photography is therefore 1:30,000.

Ground control targets were set out prior to the flight and photo recognizable points were substituted for targets that were lost. Horizontal control (referenced to NAD83) conforms to the Federal Geodetic Control Committee specifications for Second Order Class 2 GPS surveys. Vertical control (referenced to NAVD88) is within 10 cm. It is tied to second order Class II NGRS benchmarks. In addition the latitude, longitude and ellipsoidal heights of continuously operating GPS reference stations were incorporated into the control adjustment. Orthometric heights were directly measured or estimated from GPS derived ellipsoidal heights.

Aerial Triangulation (AT) block models were developed and tested for accuracy. Adjacent blocks are tied to new ones to insure a "seamless" image. These reports are on file at MassGIS.

DTM data points were collected on analytical stereoplotters at a sufficient density y to support generation of 3 meter contours conforming to the National Map Accuracy Standards (+ or - 1.5 meters). Mass points were collected along parallel scan lines 75 meters apart at variable density as a function of the topography and other ground features. Spot elevations at summits and in depressions and breaklines along significant linear features were also collected. Distinctions between "hard" and "soft" breaklines were established and standardized to facilitate the generation of contours.

The photography was scanned at 15 microns and the images were differentially rectified using the DTMs and the AT block models. The histogram for tonal adjustment provides for a range of gray

shades from 30 to 225 (out of 256), thus allowing pure black and white to be legible when over plotted on the images. Accuracy of the image was given precedence over tonal consistency at the edges of the images. The final digital images were clipped with the Orthophoto Index Grid, thus the tiles do not overlap. The images meet or exceed the National Map Accuracy Standards to the extent that 90% of the well-defined features fall within 0.5mm of their true position on the ground at the nominal output scale of 1:5,000 (2.5m on the ground). Additionally, the maximum displacement of well-defined features is less than 5 meters. Each pixel in the original digital orthophoto image represents 0.5 meters on the ground.

Each half-meter image contains 8,000 x 8,000 pixels, which equates with a file of 64 megabytes (mb). The half-meter images are stored in .BIL format with associated .HDR files. These images have been resampled at 1- (16 mb), 2- (4 mb) and 5- (640 kb) meter resolutions and are stored in tiff format with associated .TFW world files. The resampling process was done in the ARC/INFO GRID module.

MassGIS also distributes these images in the MrSID format. MrSID (Multi-resolution Seamless Image Database) is a product of Lizardtech, Inc. that uses wavelet technology to achieve high compression levels within images with minimal loss of image quality. Each half-meter .bil and one-meter tiff has been compressed at a 10:1 compression ratio with eight zoom levels. Each half-meter SID image is named <sheet-ID>.sid; each one-meter SID image is named 1_<sheet-ID>.sid. All SID images are accompanied by an associated .sdw header file for use in ArcView 3.1 with the MrSID Image Extension. The SID images may also be viewed with the MrSID Image Viewer, available free at http://www.lizardtech.com, or in other software that supports the .sid format. Also available are ten composite images in MrSID format at 1-meter resolution. These images cover large areas of the state and ensure that every major watershed may be displayed within one complete image. Orthophotos and all other MassGIS data may be ordered online at http://www.state.ma.us/mgis/order.htm or by submitting an order form found earlier in this book.

ATTRIBUTES

There are no attributes for the images. Each pixel is coded with a gray-shade value ranging from 30-225. The resampled images each have their first two left-most pixels in the top row coded as 0 (pure black) and 255 (pure white) to avoid contrast stretch when grids were converted to images.

MAINTENANCE

The datalayer is maintained by MassGIS. See the MassGIS Web site for index and status maps pertaining to the Orthophoto project (http://www.state.ma.us/mgis/maps.htm).

USGS 1:12,000 Black and White Digital Orthophoto Images
May 1998

OVERVIEW

The U.S. Geological Survey created these orthophotos as part of its National Aerial Photography Program (NAPP). They were post-processed by MassGIS to conform to same tiling scheme and projection as the MassGIS 1:5000 black and white orthophotos. The original products are 1-meter ground resolution, quarter-quadrangle (3.75-minutes of latitude by 3.75-minutes of longitude) images cast on the Universal Transverse Mercator Projection (UTM) on the North American Datum of 1983 (NAD83). The geographic extent of the DOQ is equivalent to a quarter-quad plus an overedge ranging from 50 meters to 300 meters beyond the extremes of the primary (NAD83) and secondary (NAD27) corner points. The overedge was included to facilitate tonal matching for mosaicking and for the placement of the NAD83 and secondary datum corner tics.

PRODUCTION

USGS created raster images by scanning 1:40,000 scale aerial black and white photograph film diapositives with a precision image scanner, using an aperture of approximately 25 to 32 microns. The scanner converted the photographic image densities to gray scale values ranging from 0 to 255. Scan files with ground resolution less than 1 meter or greater than 1 meter but less than 1.28 meters were resampled to 1 meter. All DOQs are cloud free within the 3.75' image area. Source photography was leaf-off in deciduous vegetation regions.

Ground control points in UTM NAD83 were acquired from ground surveys or developed in aerial triangulation models and are third order class 1 or better, and meet National Map Accuracy Standards (NMAS) for 1:12,000-scale. Horizontal and vertical residuals of aerotriangulated tie-points are equal to or less than 2.5 meters. Rectification was accomplished using Digital Elevation Models (DEMs) covering the same area as the scanned image, ground control points, orientation parameters, and a camera calibration report. All data was inspected according to a quality control plan and tested for attribute accuracy, logical consistency, data completeness and horizontal positional accuracy.

MassGIS took the USGS images and mosaicked and projected them to the Massachusetts State Plane Coordinate System, NAD83 Mainland Zone using the ARC/INFO GRID module. The projected grids were clipped to the MassGIS Orthophoto Index and converted to grayscale images. The 1-meter images (15 megabytes each) were resampled for 2- (4 mb) and 5- (640 kb) meter resolution. All three resolution images are stored in tiff format with .TFW header files. The images are named according to their resolution and Orthophoto Index SHEET-ID, separated with the letter 'u' to distinguish them from overlapping 1:5000 orthophotos (example names: 1u125918.tif, 2u125918, 5u125918.tif).

ATTRIBUTES

There are no attrribute for the images. Each pixel is coded with a gray-shade value ranging from 0-255. See http://nsdi.usgs.gov/nsdi/wais/maps/doqmet.html on the Web for full metadata.

AVAILABILITY

These images are available for Franklin County and portions of the south shore and Northern Middlesex regions. They will serve as the orthophoto base for the region until the 1:5000 orthos from the Executive Office of Environmental Affairs' (EOEA) orthophoto mapping project become availabile. Original dates of photography, obtained from the USGS images' headers, are April 28, 1992 for Franklin County and April, 1995 for the other regions.

MAINTENANCE

This datalayer is maintained by MassGIS.

Coastal Color Orthophotographs
February 1998

OVERVIEW

The color coastal orthophotographs were generated through a cooperative effort between the Massachusetts Coastal Zone Management Office, the NOAA Photogrammetry Division and the National Geodetic Survey. The data covers most of the coastal zone region. Photo Science Inc. of Gaithersburg Maryland provided digital orthophoto production.

PRODUCTION

The Photogrammetry Division of NOAA captured the color aerial photography in September and October of 1994. The scale of the original photography is 1:48,000. Differential airborne GPS was used for control. Approximately 31 flight lines were conducted, with the orientation of the flight lines designed to cover the maximum area of shoreline. Approximately 360 were captured. Approximately 16 ground panels were placed in the field and surveyed.

The Photogrammetry Division utilizing analytical stereo plotters conducted Aerotriangulation. The control was processed using 3 block areas: A) North of Boston, B) Boston south including the Elizabeth Islands, and C) Martha's Vineyard with Nantucket. Control was developed to provide an accuracy that exceeds NMAS of 1:10,000. In large portions of the area, control exceeds the NMAS for 1:7,000.

Diapositives were scanned for a final output resolution of 1.0 meter. Scanning was done to match the diapositives as closely as possible. Bulk radiometric adjustments of the imagery was conducted using Adobe Photoshop "auto levels" to remove the green haze and to stretch the contrast.

Mass point and breakline elevations were created and used in the production. Only mass point elevations are available for the area. Elevation data was developed primarily for the purpose of orthorectification, and not for detailed contouring.

The data set is tiled identically to the MassGIS black and white orthophotos for the mainland region. Data for Martha's Vineyard and Nantucket islands are in the Massachusetts Island State Plane Coordinate Zone. The tiling for the islands is similar to the scheme used on the mainland. The origin of the island zone tile scheme is not based on a mainland grid projected to an island zone. Because the original color orthophotography data development area is not identical to this tiling scheme, portions of some color othrophotograph tiles appear blank. These are inland areas where color orthophotography is not available.

The original 1-meter tiles are 48 MB per tile. 2-meter versions of the tiles are available, and are 12 MB apiece. There are 341 tiles in the mainland, 73 tiles on the island for a total of 414 tiles. The files are stored in TIFF format and are accompanied by .tfw header files.

MassGIS also distributes these images in the MrSID format. MrSID (Multi-resolution Seamless Image Database) is a product of Lizardtech, Inc. that uses wavelet technology to achieve high compression levels within images with minimal loss of image quality. Each one-meter tiff has been compressed at a 20:1 compression ratio with eight zoom levels. Each one-meter SID image is named 1c<sheet-ID>.sid, accompanied by an associated .sdw header file for use in ArcView 3.1 with the MrSID Image Extension. The SID images may also be viewed with the free MrSID Image Viewer, available on the Web at http://www.lizardtech.com, or in other software that supports the .sid format.

USGS Topographic Quadrangle Images Datalayer
December 1995

OVERVIEW

MassGIS scanned the USGS 7.5-minute series topographic quadrangles to create a digital database that can provide images of the paper maps. These images can be used as a backdrop for plotting vector data, and for interpretation and analysis. **The images are indexed by the Digital Orthophoto Quad (DOQ) Index**, producing 1600 images for the 189 paper quads. The image name is an index sheet-ID composed of the first three digits of the x and y NAD83 state plane coordinates of the image's lower right corner, prefixed by the letter 'Q'. For example an image that covers part of Northfield, MA, with lower right corner coordinates of 125000m 983000m, is named Q125938.

PRODUCTION

The paper maps were converted to image format by scanning. Unfolded USGS quadrangles were used if available. The maps were scanned with a Tangent CCS500-50TF drum scanner at 250 dots per inch (dpi) into 8 bit compressed TIFF images. Each scanned quad was registered to MA State Plane NAD27 in ARC with REGISTER. After registration, the images were converted to grids in GRID where they were then clipped of map marginalia and merged with neighboring sheets. The resulting grid was projected into NAD83 MA State Plane meters. Afterwards, the grid was clipped by a DOQ template and each clipped grid was converted back into a TIFF image. The quad images will be stored with this tiling scheme to facilitate storage of the images and allow for faster drawing times for local map extents.

MassGIS also distributes these images in the MrSID format. MrSID (Multi-resolution Seamless Image Database) is a product of Lizardtech, Inc. that uses wavelet technology to achieve high compression levels within images with minimal loss of image quality. Each scanned quad image has been compressed at a 10:1 compression ratio with eight zoom levels. Each SID image is named q<sheet-ID>.sid, accompanied by an associated .sdw header file for use in ArcView 3.1 with the MrSID Image Extension. The SID images may also be viewed with the MrSID Image Viewer, available free at http://www.lizardtech.com, or in other software that supports the .sid format.

NOAA Nautical Chart Images Datalayer
June 2001

OVERVIEW

MassGIS created a digital database of the paper nautical charts produced by the National Oceanic and Atmospheric Administration (NOAA) that cover the coastal areas of Massachusetts. These images provide a graphic portrayal of the marine environment, showing the nature and form of the coast, the depths of the water and general character and configuration of the sea bottom, locations of dangers to navigation, the rise and fall of the tides, locations of man-made aids to navigation, and the characteristics of the Earth's magnetism. In addition to providing these basic elements, nautical charts are working documents used by the mariner both as a "road map" and worksheet and are essential for safe navigation. **In conjunction with supplemental navigational aids,** they are used to lay out courses and navigate ships by the shortest and most economically safe route.

Today, nautical charts are used by the Departments of Defense and Transportation, state and local governments, commercial shippers, the fishing industry, and recreational boaters throughout the United States. Navigational charts and Coast Pilots (a series of nautical books that cover a variety of information important to navigators of coastal and intracoastal waters and the Great Lakes) are integral components necessary for safe and efficient navigation within U.S. and territorial waterways. Federal law requires all ships in excess of 1600 gross tons to have and use current editions of these navigation products. Charts and hydrographic surveys are also used by environmental groups, academia, and coastal zone planners.

DISCLAIMER: It is important to note that these images alone should not be used for navigational purposes. Because of recent updates and limitations on scale, the NOAA Nautical Chart Images distributed by MassGIS should be used primarily as a backdrop display, for plotting vector data, and for interpretation and analysis. Mariners should always consult Coast Pilots and local port authorities and harbormasters and check water and weather conditions. MassGIS, the Commonwealth of Massachusetts, and the Executive Office of Environmental Affairs do not assume responsibility for the improper use of these data.

A vector index coverage was created from the bounding coordinates of each image in ArcInfo. This coverage, named **NOAAINDX** for both layer and coverage, is stored in the NE library and may be used to reference the location of each chart. Use the CHART item in the REGION.CHART subclass as the selection field.

PRODUCTION

The paper maps were converted to image format by scanning. See the table below for the names, scales, and dates of the maps that MassGIS used in this project. The maps were scanned with a Tangent CCS500-50TF drum scanner at 250 dots per inch (dpi) into 8 bit compressed pseudo-color TIFF images. Each scan was registered using ArcInfo's REGISTER command to the Mercator projection (the projection of the paper maps) using degrees-minutes-seconds latitude/longitude coordinates listed on each map, as well as each chart's specific latitude of true scale and central meridian. The DMS coordinates were converted to Mercator by way of an intermediate projection through the Universal Transverse Mercator projection, a step required to work around a software bug in ArcInfo. The Mercator-based images were then converted to Grids and projected to the MA State Plane Mainland Zone coordinate system, datum NAD83, units meters in ArcInfo. After registration, the grids were clipped of map marginalia to allow seamless display with adjacent images. Depending on the layout of each chart, some images were clipped into multiple pieces for faster display, eliminating the need to draw large non-data areas. Additionally, some charts contained larger-scale inset maps of harbors and small inlets. These were clipped out of the main chart image and registered separately.

Following this initial round of registration, the georeferencing of some images was further fine tuned by matching to features in the Nautical data layer, which contains NOAA chart major linework with

high spatial accuracy such as channel boundaries and pipelines. As a result, some images, especially large scale inset maps, may appear not to align properly with smaller-scale vector data (e.g. the 1:25,000 Town Boundaries). Each grid then was converted back into a TIFF image, with the ".tif" file extension for the image and ".tfw" for the header file (which stores georeferencing information used for proper display by GIS software). Each TIFF image was converted into the MrSID image file format at 30:1 compression and eight zoom levels. MrSID files have the ".sid" (image) and ".sdw" (header) file extensions. MassGIS makes available both the TIFF and MrSID versions of the images. With clipping and inset maps, 67 total images were produced.

Each image file is named according to the five-digit number assigned by NOAA, prefixed with the letter 'n'. An 'e' or 'w' after the number indicates eastern and western portions of the chart. Charts that have been clipped into multiple pieces have an underscore character followed by a number (e.g. n13227_2). Inset maps contain the letter 'i' after the five-digit number. If multiple inset maps were clipped from one original chart image, each file name has an additional 'a', 'b' or 'c' after the 'i' (e.g. n13238ia, n13238ib).

The following table lists the file name, chart title and original paper map scale and date of printing for all the images in this layer.

File Name	Chart Title	Scale	Date
n13003	Cape Sable To Cape Hatteras	1200000	7/22/95
n13006	West Quoddy Head To New York	675000	3/5/94
n13009	Gulf Of Maine And Georges Bank	500000	3/11/95
n13200	Georges Bank And Nantucket Shoals	400000	9/11/93
n13204e n13204w	Georges Bank, Eastern Part	220000	7/7/90
n13218	Marthas Vineyard To Block Island	80000	6/26/93
n13221	Narragansett Bay	50000	4/15/95
n13226 n13226_2 n13226_3 n13226_4 n13226_5 n13226_6	Mount Hope Bay	20000	12/12/92
n13227 n13227_2	Fall River Harbor	10000	4/14/90
n13227i	Fall River Harbor - State Pier	2500	4/14/90
n13228	Westport River And Approaches	20000	6/13/92
n13230 n13230_2	Buzzards Bay	40000	4/29/95
n13230i	Buzzards Bay - Quicks Hole	20000	4/29/95
n13233 n13233_2 n13233_3 n13233_4	Marthas Vineyard	40000	11/28/92
n13233i	Marthas Vineyard - Menemsha Pond	20000	11/28/92
n13235	Woods Hole	5000	8/13/91
n13236 n13236_2 n13236_3	Cape Cod Channel And Approaches	20000	4/2/94
n13237	Nantucket Sound And Approaches	80000	6/18/94
n13238 n13238_2	Marthas Vineyard (Eastern Part)	20000	6/27/92
n13238ia	Oak Bluffs Harbor	10000	6/27/92
n13238ib	Vineyard Haven Harbor	10000	6/27/92
n13238ic	Edgartown Harbor	10000	6/27/92
n13241	Nantucket Island	40000	6/6/92
n13244	Eastern Entrance To Nantucket Sound	40000	11/26/94

n13246	Cape Cod Bay	80000	9/25/93
n13248	Chatham Harbor And Pleasant Bay	20000	4/7/90
n13249	Provincetown Harbor	20000	8/16/90
n13250 n13250_2	Wellfleet Harbor	40000	8/18/89
n13250i	Sesuit Harbor	10000	8/18/89
n13251	Barnstable Harbor	20000	7/29/89
n13253 n13253_2	Plymouth, Kingston And Duxbury Harbors	20000	3/5/88
n13253i	Green Harbor	10000	3/5/88
n13260	Bay Of Fundy To Cape Cod	378838	10/16/93
n13267 n13267_2	Massachusetts Bay (Outer Boston Harbor)	80000	1/1/94
n13267i	North River	20000	1/1/94
n13269	Cohasset And Scituate Harbors	10000	6/9/90
n13270	Boston Harbor	25000	1/7/95
n13272 n13272_2	Boston Inner Harbor	10000	6/28/95
n13275 n13275_2	Salem and Lynn Harbors	25000	10/9/93
n13275i	Manchester Harbor	10000	10/9/93
n13276	Salem, Marblehead and Beverly Harbors	10000	8/5/95
n13278	Portsmouth To Cape Ann	80000	6/10/95
n13278i	Hampton Harbor	30000	6/10/95
n13279 n13279_2	Ipswich Bay To Gloucester Harbor	20000	4/22/95
n13279i	Rockport Harbor	5000	4/22/95
n13281	Gloucester Harbor And Annisquam River	10000	6/3/95
n13282	Newburyport Harbor and Plum Island Sound	20000	3/23/91

ATTRIBUTES

The images files do not contain attributes. Sounding values on the images with scales 2,500 - 80,000 are in feet at mean low water. Soundings on smaller scale maps are in fathoms.

The **NOAAINDX.PATCHART** region attribute table for the index coverage contains the following item:

ITEM NAME	WIDTH	OUTPUT	TYPE
CHART	7	7	C

ADDITIONAL REFERENCES

When using these NOAA Chart images, it may be helpful to refer to these Web sites, which contain a multitude of links, including user manuals, map symbol descriptions and more:

- NOAA's "Office of Coast Survey" - http://chartmaker.ncd.noaa.gov/
- "Navigational Charts" - http://chartmaker.ncd.noaa.gov/staff/charts.htm

MassGIS does not sell or distribute paper copies of the NOAA Nautical charts. Such maps may be viewed at some major libraries and are for sale from Authorized Nautical Chart Sales Agents (view a list online at http://chartmaker.ncd.noaa.gov/NSD/states.html) and other vendors.

In addition, the National Ocean Service Mapfinder Web site (http://mapfinder.nos.noaa.gov/) provides online viewing of NOAA Chart images.

Forested Landcover Images Datalayers
July 1999

OVERVIEW

MassGIS has derived two images representing forested area in the Commonwealth for use in the Massachusetts Resource Identification Project:

1) The GAP Forest datalayer is a derivative of the Southern New England Vegetation datalayer, a GAP project component. An image was created from the original GAP SNEVEG 1.0 data set (in ARC/INFO Grid format) by selecting the following landcover classes (alliance level):
Forested Wetland, Suburban Forest, Conifer, Mixed, Oak/Maple/Birch, Birch Dominant, Oak Dominant, Red Maple Dominant, Northern Hardwoods

2) The MRLC Forest datalayer is a derivative of the National Land Cover Datalayer (NLCD) developed from Thematic Mapper satellite data acquired by the Multi-Resoultion Land Characterization (MRLC) Consortium. The following landcover classes (with class numbers in parentheses) were selected from the original MRLC NLCD data set (in ARC/INFO Grid format):
- Deciduous Forest (41) - Areas dominated by trees where 75 percent or more of the tree species shed foliage simultaneously in response to seasonal change.
- Evergreen Forest (42) - Areas dominated by trees where 75 percent or more of the tree species maintain their leaves all year. Canopy is never without green foliage.
- Mixed Forest (43) - Areas dominated by trees where neither deciduous nor evergreen species represent more than 75 percent of the cover present.
- Deciduous Shrubland (51) - Areas dominated by shrubs where 75 percent or more of the shrub species shed foliage simultaneously in response to seasonal change.
- Woody Wetlands (91) - Areas of forested or shrubland vegetation where the soil or substrate is periodically saturated with or covered with water as defined by Cowardin et al.

New Grids were created from their respective subsets and then converted to Tiff images in ARC/INFO. Both images are available in Tiff and MrSID format. File names are as follows:

	Gap Forest	**MRLC Forest**
Tiff	gap-for.tif	mrlc-for.tif
MrSID	gap-for.sid	mrlc-for.sid

ATTRIBUTES

There are no attributes associated with the images. Creating a map legend for the GAP and MRLC Forest images may be achieved by using the CODE item in the coverage MRLCLEG. Values of CODE correspond to the classes of forest type. MassGIS has created two ArcView legend files - gapfor.avl and mrlcfor.avl – to be used for this purpose. The legend files and coverage (in ESRI Shapefile and Arc/Info Export File formats) are distributed with the images.

These derived images depicting select forest class information allow users to directly focus on forest-related landcover, without first having to extract the features from a larger dataset with many additional landcover classifications. Providing the information in image format extends the data to GIS users who do not have GIS software supporting the ARC/INFO Grid format. The GAP SNEVEG and MRLC NLCD datalayers may be obtained in Grid format with original attribute information per special request from MassGIS.

ADDITIONAL INFORMATION

Development of the GAP Forest datalayer: http://outsider.fnr.umass.edu/gaphome.html.
GAP Project: http://www.gap.uidaho.edu/gap/
Development of the MRLC Forest datalayer: http://edcwww.cr.usgs.gov/programs/lccp.

Community Boundaries (Towns) Datalayer
March 1991

OVERVIEW

The political boundary datalayer is a 1:25,000 scale datalayer containing the boundaries of the 351 communities in Massachusetts. The seaward boundary of coastal communities has been defined at mean high water in this datalayer. This datalayer is stored as a single statewide coverage, **TOWNS**, in the STATE library.

PRODUCTION

This datalayer, except the coastline, was digitized by MassGIS from a set of stable based film prints of the 1:25,000 7.5' quadrangles purchased from the USGS by the Massachusetts Dept. of Public Works. The coastline was taken from the USGS 1:100,000 hydrography DLG database. It was selected visually and appended to the digitized town boundaries.

ATTRIBUTES

Several items have been added to the **TOWNS.PAT**

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	Contents
AREA	4	12	F	3		Area in square meters
PERIMETER	4	12	F	3		Perimeter in meters
TOWNS#	4	5	B	0		
TOWNS-ID	4	5	B	0		
TOWN-ID	4	5	B	0	MASSGIS-TOWN-COD	MassGIS Town-ID Code (alphabetical, 1-351)
TOWN	21	21	C	-	TOWN-NAME	Town Name
FIPS-STCO	5	5	I	-	FIPS-ID	Federal Information Processing Standard (FIPS) State/County Code
CCD/MCD	3	3	C	-	CENSUS-TOWN-CODE	US Census Town Code
FIPS-PLACE	5	5	C	-	FIPS-TOWN-CODE	Federal Information Processing Standard (FIPS) Town Code
POP80	7	9	I	-	CEN-POPULATION80	US Census Town Population: 1980
POP90	7	9	I	-	POP	US Census Town Population: 1990
ISLAND	1	1	I	-		Polygon is (1)/is NOT (0) an island - many towns are composed of many polygons.
*** REDEFINED ITEMS ***						
FIPS-MCD	8	8	I	-	FIPS+CEN-TOWN-CO	FIPS State & County & Census Town Code concatenated
FIPS-COUNTY	3	3	I	-	COUNTY-CODE	FIPS County only code

A **TOWNS.AAT** was created and an item added called OUTLINE that identifies the outside polygon of the state. This enables differentiation of line type (e.g. dashed lines inside the state and solid for the outside). The outline = 1, internal boundaries = 17 (a dashed line in the MassGIS default symbolset).

Annotation has been added to the coverage. Level 1 places town names within the town boundaries while levels 2 and 3 place annotation along town boundaries.

RELATED DATABASE FILES

TOWNS.AREACODE stores telephone area codes for each municipality and reflects the addition of four new "overlay" codes in Massachusetts (339, 351, 774, 857) that took effect on April 2, 2001. For more information on the Commonwealth's area codes, see Verizon's Massachusetts' area codes Web page at http://www.bellatlantic.com/areacode/pages/ma.htm.

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	ALT. NAME	Contents
TOWN-ID	8	11	F	0	TOWN_ID	Town ID, used to relate to TOWNS.PAT
AREACODE	4	3	B	-		Town Area Code (413, 508/774, 617/857, 781/339, 978/351)

TOWNS.MWRATOWN stores information on which towns receive water and/or sewer service from the Massachusetts Water Resources Authority.

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	Contents	
TOWNS_ID	8	16	F	0	Relates to TOWNS-ID in TOWNS.PAT	
CODE	2	2	C	-	Service Code: S = Sewer only	W = Water only

WS = Water and Sewer N = No service

TOWNS.ESTDEV - Estimated Acres of Development - was created for the Massachusetts Audubon report, "Losing Ground II". The table stores estimated development figures from a predictive model created by consultants Phillip Herr and Associates. An ARC/INFO relate was established between the MassGIS Towns coverage and an attribute table provided by Herr and Associates. Values of the item AC_SQMI are normalized representations of estimated development (commercial and residential) expressed as acres per square mile by each community, not the total number of acres predicted to be developed.

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	Contents
TOWN-ID	8	11	F	0	Town ID, used to relate/join to TOWNS.PAT
AC_SQMI	8	16	F	4	See description in above paragraph

TOWNS.SPECDENS - Species Density - was created for the Massachusetts Audubon report, "Losing Ground II". It enables general display of the density (not the actual locations) of rare, threatened, and special concern species within Massachusetts communities. This table was developed from an ARC/INFO relate between the MassGIS Towns datalayer and an element occurrence (EO) database (1974-1999) provided by the Natural Heritage & Endangered Species Program's (NHESP) Biological and Conservation Data System. Values in the EO_SQMI field represent species (element) occurrences per square mile (density) within each community, as opposed to categorizing communities based upon the sum of EO records per community as displayed in the recent publication, "Our Irreplaceable Heritage".

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	Contents
TOWN-ID	8	9	F	0	Town ID, used to relate/join to TOWNS.PAT
EO_SQMI	8	16	F	2	See description in above paragraph

TOWNS.RDDENS - Road Density - was created for the Massachusetts Audubon report, "Losing Ground II". Its intended use is to provide a general indication of the amount and density (i.e. level of fragmentation) of road development within Massachusetts communities. It does not display where roads are located within each community and therefore should be used for general planning purposes only. This table was developed from an ARC/INFO union between the MassGIS Towns and Mass. Highway Department Roads datalayers. Values in the FEET_ACRE field represent total road length in feet per acre, per community. All classes of roads were included in the assessment.

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	Contents
TOWN-ID	8	9	F	0	Town ID, used to relate/join to TOWNS.PAT
FEET_ACRE	8	16	F	2	See description in above paragraph

Community Boundaries without Coast Datalayer
April 1992

OVERVIEW

The political boundary coverage is a datalayer containing onshore and offshore boundaries for the 351 communities of Massachusetts. Note that **no** coastline appears in this data.

This datalayer is stored as a single statewide coverage, **BOUNDARY**, in the STATE library.

MANUSCRIPT

Sources of this data are Chapter 196 Acts of 1881 boundaries drafted onto 1:80,000 NOAA charts and town boundaries from the USGS 1:25,000 topographic series published on stable based film.

ATTRIBUTES

The coverage .AAT has an item, **TYPE**, that allows you to choose either onshore boundaries ('dry') with **TYPE = 1**, or offshore boundaries ('wet') with **TYPE = 2**.

This data layer also has a .PAT with the following items:

ITEM NAME	WDTH	OPUT	TYPE	N.DEC	ALTERNATE NAME	DESCRIPTION
AREA	4	12	F	3		
PERIMETER	4	12	F	3		
BOUNDARY#	4	5	B	0		
BOUNDARY-ID	4	5	B	0		
TOWN-ID	4	5	B	0	MASSGIS-TOWN-COD	MassGIS Town-ID Code (alphabetical, 1-351)
TOWN	21	21	C	-	TOWN-NAME	Town Name
FIPS-STCO	5	5	I	-	FIPS-ID	Federal Information Processing Standard State/County code
CCD/MCD	3	3	C	-	CENSUS-TOWN-CODE	US Census Town code
FIPS-PLACE5	5	C	-		FIPS-TOWN-CODE	Federal Information Processing Standard Town code
POP80	7	9	I	-	CEN-POPULATION80	US Census Town population 1980
POP90	7	9	I	-	POP	US Census Town population 1990

PRODUCTION

MassGIS digitized the onshore community boundaries from a set of stable based film prints of the 1:25,000 7.5' USGS quadrangles. Offshore boundaries were digitized by DFWELE from 1:80,000 NOAA charts. The two were merged into one complete boundaries coverage. Along the eastern portion of the state offshore boundaries include those town boundaries that fall within rivers and other water bodies. For western Massachusetts all town boundaries are currently coded as onshore, 'dry' boundaries.

Note: The outer boundaries based on the Acts of 1881 do not necessarily coincide with the limits of the state territorial waters or state or town jurisdiction.

MAINTENANCE

MassGIS and DFWELE are maintaining this datalayer.

County Boundaries Datalayers

March 1991

OVERVIEW

MassGIS derived the boundaries of the 14 counties in Massachusetts from the community boundaries datalayers. Two statewide coverages are available:

- **COUNTIES** - contains the 1:100,000 coastline (from the TOWNS coverage)
- **COUNTYNC** - contains the full municipal boundaries extending offshore (from the BOUNDARIES coverage).

PRODUCTION

Using ARC/INFO, the TOWNS and BOUNDARIES layers were dissolved based on the FIPS_STCO field.

ATTRIBUTES

The **COUNTIES.PAT** contains these items:

FIPS-ID	Federal Information Processing Standard state/county code
COUNTY	County name
AREA-ACRES	County area in acres

The **COUNTYNC.PAT** contains this item:

FIPS-COUNTY	the unique identifier for each quad corner
FIPS-ID	Federal Information Processing Standard state/county code
COUNTY	County name

The FIPS-ID - County pairs are as follows:

FIPS-ID	COUNTY
25001	BARNSTABLE
25003	BERKSHIRE
25005	BRISTOL
25007	DUKES
25009	ESSEX
25011	FRANKLIN
25013	HAMPDEN
25015	HAMPSHIRE
25017	MIDDLESEX
25019	NANTUCKET
25021	NORFOLK
25023	PLYMOUTH
25025	SUFFOLK
25027	WORCESTER

MAINTENANCE

MassGIS is maintaining these layers. Middlesex, Franklin, Hampden, and Worcester Counties have been dissolved by the state Legislature. The Franklin Regional Council of Governments has banded as a volunteer organization to include towns of the former county.

State Outlines Datalayers
March 1991

OVERVIEW

Two datalayers are available that represent the outline of the Commonwealth of Massachusetts:

- **OUTLINE** - contains the state outline with a 1:100,000 coastline
- **OUTLN25** - contains the state outline with a 1:25,000 coastline

PRODUCTION

For the both layers, MassGIS digitized 1:25,000 linework from U.S. Geological Survey mylar map sheets for land boundaries. For the OUTLINE layer, a 1:100,000 coastline was extracted from USGS Digital Line Graphs. For OUTLN25, the coastline from the 1:25,000 Hydrography layer was used. All processing was done in ARC/INFO.

ATTRIBUTES

The **OUTLINE.PAT** contains this item:

AREA-ACRES	Polygon area in acres

The **OUTLINE.AAT** contains this item:

SYMBOL	1 = Inland boundary 4 = Coastline (100k)

The **OUTLN25.AAT** contains these items:

COAST	Y = Coastline (25k) N = Inland boundary
SYMBOL	0 = Coastline (25k) 5 = Inland boundary

MAINTENANCE

MassGIS is maintaining these layers.

Quadrangle Template Datalayer
March 1989

OVERVIEW

MassGIS has adopted the Massachusetts State Plane Coordinate System (SPC) as its standard coordinate reference system, using the mainland zone throughout the state. The quadrangle template datalayer contains the boundaries and Massachusetts State Plane Coordinate values of the corners of the 189 1:25,000 USGS topographic sheets that cover Massachusetts. This datalayer is of great utility to any project planning to digitize information that has been compiled onto the 1:25,000 quad sheets because it insures that the data will register to the other datalayers in the MassGIS system.

This datalayer is stored as a single statewide coverage, **QUADS**, in the STATE library.

PRODUCTION

MassGIS project staff devised a simple numbering system to identify each quadrangle and the corners of all quadrangles. Staff then used NADCON to translate the longitude and latitude of the quadrangle corners into Massachusetts State Plane Coordinate values. These values were put into an INFO database and used to generate an Arc/INFO datalayer. Arcs delineating the quadrangle borders were also generated.

ATTRIBUTES

The **QUADS.PAT** contains two items of note:

QUAD-NAME	the USGS name for each quadrangle
QUAD_ID	the unique identifier for each quadranglee

The **QUADS.TIC** contains three items:

IDTIC	the unique identifier for each quad corner
XTIC	the number of feet east of the SPC origin
YTIC	the number of feet north of the SPC origin

EDITING

MassGIS carefully proofread the SPC coordinates of the quad corners. Many plots were made at 1:25,000 and smaller scales.

NOTE: This datalayer, as all other data in the MassGIS database, is stored in NAD83. Please be sure to project this coverage back to NAD27 if you intend to digitize from a 1:25,000 USGS paper quadrangle. The tics of this coverage are the NAD27 tic marks on both the single and doublewide USGS maps.

Digital Quadrangle Template Datalayer
April 1993

OVERVIEW

U.S. Geological Survey's Digital Line Graph (DLG) data is available through MassGIS. The paneling scheme for the 1:25,000 (DLG) data is based on this digital quadrangle template of 210 quadrangles. The grid differs from the Quadrangle Template, which is based on the 1:25,000 USGS 7.5 minute topographic quadrangles. For most of Massachusetts, though, the paneling schemes are identical. The quadrangle panels and numbering scheme vary along the coast, primarily for the Cape and Islands quads. Please refer to the appendix for a map of both grids and a listing of the corresponding datalayers that are paneled by each grid.

This datalayer is stored as a single statewide coverage, **USGSGRID**, in the STATE library.

PRODUCTION

The coverage was generated by the Arc/INFO GENERATE command. Using the PROJECT command, the coverage was projected into Massachusetts State Plane Feet, NAD27. The coverage was then built and attributes added to the polygons to identify the digital quadrangles. One additional quad was added to the coverage for ease of processing some of the coastal data. This quadrangle (DIG-ID = 158-S), however, may not correspond to USGS DLG data. The coverage has since been projected into the Massachusetts State Plane Coordinate System, NAD83 meters.

ATTRIBUTES

The **USGSGRID.PAT** contains the two items to identify each quadrangle:

QUAD-NAME	25	25	C	Quadrangle name
DIG-ID	5	5	C	Quadrangle identifier; may have a -W,-E or other extension

MAINTENANCE

This datalayer is being maintained by MassGIS.

MA State Plane Grid and Points Datalayer
March 1989

OVERVIEW

MassGIS has adopted the Massachusetts State Plane Coordinate System (SPC) as its standard coordinate reference system, using the mainland zone throughout the state. MassGIS has generated an SPC point coverage called **GRID10K**. Using a grid with 10,000 feet on a side, the points were derived from the grid intersections. This coverage can be plotted on a map as coordinate reference. The plotting of coordinates on a map enables that map to be used as a compilation manuscript for further data automation. The points can be used as 'TICS' to register the plot/manuscript on the digitizing table. This is of great utility to any project planning to digitize information that needs to be compiled onto GIS plots because it insures that the new data will register to the other datalayers in the MassGIS system.

This datalayer is stored as a single statewide coverage, **GRID10K**, in the STATE library.

PRODUCTION

MassGIS staff produced GRID10K using the Arc/INFO command GENERATE. The grid starts at the origin of the Massachusetts SPC Mainland Zone and has a grid block size of 10,000 feet on a side. MassGIS then made the point coverage by using the Arc/INFO command NODEPOINT, in which each node of the grid was converted into a point in the new datalayer. Next the SPC northing and easting of each point was added to the attribute database (.PAT) using the command ADDXY.

ATTRIBUTES

The **GRID10K.PAT** contains two items of note:

X-COORD the number of feet east of the SPC origin
Y-COORD the number of feet north of the SPC origin

EDITING

MassGIS carefully proofread the SPC coordinates of the quad corners.

MAINTENANCE

MassGIS is maintaining this datalayer.

UTM Grid and Points Datalayers
May 1996

OVERVIEW

The Universal Transverse Mercator (UTM) grid is an X-Y coordinate system used as a reference on medium- to small-scale maps for representing the three-dimensional curved surface of the earth on a 2-D plane (e.g. a map or computer screen). In this grid, the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. These zones are numbered consecutively beginning with Zone 1, between 180° and 174° west longitude, and progressing eastward to Zone 60, between 174° and 180° east longitude. Thus, the conterminous 48 States are covered by 10 zones, from Zone 10 on the West Coast through Zone 19 in New England. In each zone, coordinates are measured north and east in meters. (One meter equals 39.37 inches, or slightly more than 1 yard.) The northing values are measured continuously from zero at the Equator, in a northerly direction. Southerly values are similarly measured from the Equator, south. A central meridian through the middle of each 6° zone is assigned a "false" easting value of 500,000 meters. Grid values to the west of this central meridian are less than 500,000; to the east, more than 500,000.

MassGIS provides 2 datalayers - **UTMGRID** and **UTMPTS** - which represent this referencing system for the parts of the two Zones (18 and 19) that cover Massachusetts. Both layers reside in the STATE library. UTMGRID is a polygon/line coverage that can be plotted on a map as a coordinate reference. UTMPTS is a point layer that represents the nodes (line intersections) of the UTMGRID layer.

PRODUCTION

MassGIS staff produced UTMGRID using the ARC/INFO command GENERATE. Because two Zones cross Massachusetts and meet at the 72-degrees line of longitude (west of Worcester), each was generated separately, converted to the Mass. Stateplane Mainland coordinate system, and then joined in Arc with MAPJOIN. Consequently, along the "seam" of the two zones the grid blocks have varying sizes and shapes. (Traditionally, map series that use the UTM system, i.e. USGS Topographic Maps, are tiled so that no two zones appear in the same map sheet, thus avoiding such geometric inconsistency.) MassGIS then made the point coverage by using the ARC/INFO command NODEPOINT, in which each node of the grid was converted into a point in UTMPOINT.

ATTRIBUTES

The **UTMGRID.PAT** contains the following item:

ZONE = 18 to the west of 72-degrees longitude
= 19 to the east of 72-degrees longitude

MAINTENANCE

MassGIS is maintaining these datalayers. For additional resources on the UTM coordinate system, visit the following Web sites:

- http://www.nps.gov/prwi/readutm.htm
- http://mapping.usgs.gov/mac/isb/pubs/factsheets/fs15799.html

Latitude/Longitude Graticules Datalayers
August 1995

OVERVIEW

Two coverages are available that represent the graticule of latitude and longitude linework that covers Massachusetts:

- **MINLL1** - 1-minute latitude-longitude lines
- **MINLL10** - 10-minute latitude-longitude lines

These 2 coverages are stored in the NE library and are meant to be used for general planning and educational purposes.

PRODUCTION

The Mass. Department of Fisheries and Wildlife used ARC/INFO to generate points in Degrees-Minutes-Seconds coordinates, which were then projected to the Mass. State Plane coordinate system. The points were then used to create line coverages.

ATTRIBUTES

The **MINLL10.AAT** contains these items:

LAT	Latitude value of the line ("NA" if line is longitudinal)
LONG	Longitude value of the line ("NA" if line is latitudinal)
LINE_0	Indicates whether the line is a 00 seconds line (i.e. 44 00 00)

The **MINLL1.AAT** does not contain any items other than those standard in an arc attribute table.

MAINTENANCE

MassGIS is maintaining these layers.

Massachusetts House Legislative Districts Datalayer
January 2001

OVERVIEW

The Massachusetts House Legislative Districts datalayer reflects the House district boundaries as defined by Chapter 273 of the Acts of 1993. Names of elected officials are up-to-date through January 2001.

This datalayer is stored as a single statewide coverage, **HOUSE93**, in the STATE library.

PRODUCTION

Election Data Services, Inc (Washington, DC) produced the coverage under contract to the Massachusetts House of Representatives. The coastline was appended to the coverage by Applied Geographics (Boston, MA) with additional editing completed by MassGIS. The datalayer was created to produce the Massachusetts House Legislative Districts Map dated August 30, 1994. The Districts map is available at the Massachusetts State House Bookstore.

ATTRIBUTES

The HOUSE93.PAT has the following items; the last three are of note:

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC
AREA	4	12	F	3
PERIMETER	4	12	F	3
HOUSE93#	4	5	B	
HOUSE93-ID	4	5	B	
NAME	64	64	C	
COLORS	16	16	I	
LABEL	2	3	I	
INSET	2	3	I	
HOUSE_LEGISLATIVE	25	25	C	
NUMBER	3	3	I	

HOUSE_LEGISLATIVE is the name of the district, while NUMBER is a unique number for each district. INSET helps to identify urbanized areas for producing a large scale map inset.

In HOUSE93.AAT, item COAST distinguishes between state and internal boundaries. To select the state boundary, reselect arcs where COAST = 1.

Massachusetts Senate Legislative Districts Datalayer
January 2001

OVERVIEW

The Massachusetts State Senate Legislative Districts datalayer reflects the State Senate district boundaries as defined by Chapter 274 of the Acts of 1993. Names of elected officials are up-to-date through January 2001.

This datalayer is stored as a single statewide coverage, **SENATE93**, in the STATE library.

PRODUCTION

Election Data Services, Inc (Washington, DC) produced the coverage under contract the Massachusetts Senate. A coastline was appended to the coverage by Applied Geographics (Boston, MA) with additional editing completed by MassGIS. The datalayer was created to produce the Massachusetts State Senate Legislative Districts Map dated April 7, 1994. The Districts map is available at the Massachusetts State House Bookstore.

ATTRIBUTES

The SENATE93.PAT has the following items; the last described below are of note:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC
1	AREA	4	12	F	3
5	PERIMETER	4	12	F	3
9	SENATE93#	4	5	B -	
13	SENATE93-ID	4	5	B -	
17	NAME	64	64	C -	
81	DIST-NUM	10	10	I -	
91	COLOR	2	3	I -	
93	COLORS	4	4	I -	
97	LABEL	3	3	I -	
100	SENATORS	40	40	C -	
140	DIST-NAME	40	40	C -	

SENATORS is the item identifying the Senator of the District, DIST-NAME is the name of the district and DIST-NUM is a unique number for each district.

In SENATE93.AAT, the item COAST differentiates between district boundaries that are also state boundaries (COAST = 1) and internal boundaries.

Digital Orthophoto Index Datalayers
June 2001

OVERVIEW

The Digital Orthophoto Index layer is a 4,000 by 4,000 meter grid in MA State Plane coordinates which serves as an index for the digital orthophotos. The MA State Plane projection splits the State into Mainland and Island Zones, and the orthophoto images as produced are referenced to the correct Zone. Thus, two orthophoto grid templates exist for the Commonwealth. This represents a change from other MassGIS datalayers which are registered to the Mainland Zone only. The Island Zone contains Martha's Vineyard, Nantucket and the Elizabeth Islands. The Mainland Zone cover is stored as **OQMAIN** and the Island Zone is stored as **OQISLE**. The naming convention for each grid cell is based on the NAD83 meters coordinate pair for the lower right corner of the cell. The Grid ID is composed of the first 3 digits of each coordinate in this xy pair. For example, a grid cell with xy coordinates of 253000m 942000m at the lower right corner would have an ID of 253942. All datalayers registered to these index covers will have the grid number ID as part of their name.

OQMAIN and **OQISLE** are stored as single statewide coverages in the STATE library.

PRODUCTION

The index grids were generated by the Arc/INFO GENERATE command. The PROJECT command was used to orient the grids to the MA State Plane meters coordinate system and the two zones. Each grid cell is 4000 meters by 4000 meters.

ATTRIBUTES

The OQx.PAT contains the following items:

SHEET_ID	4	6	B	Unique identifier of the grid cell. Concatenated string based on the first 3 digits of the lower right corner XY coordinate pair.
PROJECT	3	3	C	Name of project under which orthos have been or will be flown
DATEPHOTO	8	8	I	Date photography was taken.
DATEDIGITAL	8	8	I	Date digital product was received by MassGIS.
DATECONTOURS	8	8	I	Date that 3 meter contours were or will be produced
DATECONTROL	8	8	I	Date that control was completed
DATEPOINTS	8	8	I	Date that orthophoto point elevations were added to the library
DATEROADS	8	8	I	Date that orthophoto road centerlines were added to the library
DATEWET	8	8	I	Date OQ wetlands were added to the library
DATESTRM	8	8	I	Date OQ streams were added to the library
USGSPHOTO	8	8	I	Date of photography of USGS produced orthophotos
PROJ_AREA	15	15	C	Intermap's project area as indicated on their product CD label
CD-ID	2	2	C	Intermap's CD-ID number as indicated on their product CD label
CD_COPIES	1	1	I	Number of copies of CD MassGIS has received from Intermap
COMMENT	20	20	C	Comment field
YEARPHOTO	4	4	I	Year of photography
CD_CODE	17	17	C	Concatenation of PROJ_AREA and CD-ID

The OQx.TIC contains tics for each intersection of the arcs. The item that identifies these tics is:

IDTIC	4	6	B	Concatenated string based on the first 3 digits of the lower right corner XY coordinate pair

MAINTENANCE

These datalayers are maintained by MassGIS. The "Date" items in the .PAT are updated as new OQ-tiled data (e.g. 1:5,000 Wetlands and Streams, Contours) are entered into the OQ and OQE libraries.

Color Coastal Orthophotos Index Datalayer
June 2001

OVERVIEW

This datalayer represents the indexing scheme for the 1:10,000 Coastal Color Orthophotos. The polygons in this index coverage were extracted from the statewide orthophoto index coverage (OQMAIN) for which color orthophotos are available, for both the mainland and island regions. Mass. Coastal Zone Management developed the layer, named **COQMAIN** and stored in the STATE library. The six-digit orthophoto ID is stored in the character field TILE-NAME and in the integer field SHEET-ID.

MAINTENANCE

MassGIS maintains this datalayer.

Coastal Zone Tiling Index Datalayer
April 1997

OVERVIEW

The Massachusetts Coastal Zone Management (MCZM) Program has developed an index to identify the geographic bounds, name and identification number for a series of MCZM published maps. Each tile measures 8,000 by 10,000 meters. The tile orientation is in both landscape and portrait. This tile scheme allows for plotting at a scale up to 1:10,000 in a single panel on a HP 755 device. The data are stored as a single statewide coverage named **CZMSHEET** in the **STATE** library.

METHODOLOGY

A polygon coverage was developed from keyboard entered coordinates. The geographic bounds of each tile are located on an increment of 2,000 meters.

ATTRIBUTES

The data layer has a .PAT with the following items:

Item Name	Width	Output	Type	Comments
NUMBER	4	4	C	Unique alpha-numeric code such as C-25
NAME	24	24	C	Place name identifier for the individual sheet
LAYOUT	1	1	C	L for Landscape P for Portrait

MAINTENANCE

MCZM maintains this datalayer.

Massachusetts DEP Regions Datalayer
July 1998

OVERVIEW

The DEP Regions layer represents boundaries used by the Massachusetts Department of Environmental Protection for planning and administrative purposes. The statewide coverage and layer are both named **REG_DEP**.

ATTRIBUTES

The **REG_DEP.PAT** (polygon attribute table) contains the following items:

REGION	DEP Administrative Region
DEP-ID	DEP Region Identifier

Codes are as follows:

REGION	DEP-ID	Description
WEST	1	Western region - Springfield headquarters
CEN	2	Central region - Worcester headquarters
NE	3	Northeast region - Woburn headquarters
SE	4	Southeast region - Lakeville headquarters

MAINTENANCE

MassGIS maintains this datalayer.

Massachusetts DEM Regions Regions Datalayer
July 1998

OVERVIEW

The DEP Regions layer represents boundaries used by the Massachusetts Department of Environmental Management for planning and administrative purposes. The statewide coverage/layer was derived from the Towns layer by DEM staff. It is named **REG_DEM**.

ATTRIBUTES

The **REG_DEM.PAT** (polygon attribute table) contains the following items:

REGION	Abbreviated name of regions
ALTREG	Region number

Codes are as follows:

ALTREG	REGION
1	Southeast
2	Northeast
3	Central
4	Connecticut
5	Berkshire

MAINTENANCE

MassGIS maintains this datalayer.

Regional Planning Agencies Datalayer
July 1998

OVERVIEW

This datalayer represents the boundaries of the 13 regional planning agencies (RPAs) in Massachusetts. Each RPA serves as a forum for state and local officials to address issues of regional importance, including the development of comprehensive plans and recommendations in areas of population and employment, transportation, economic development, regional growth and the environment. The layer was created in ARC/INFO based on the Towns layer and lists from each RPA and their member communities. The layer is named **RPAS** and is stored in the STATE library.

ATTRIBUTES

The **RPAS.PAT** (polygon attribute table) contains the item RPA, which represents the ID number of the regional planning agency. The key is as follows:

1 - BERKSHIRE COUNTY REGIONAL PLANNING COMMISSION
2 - FRANKLIN COUNTY PLANNING DEPARTMENT
3 - PIONEER VALLEY PLANNING COMMISSION
4 - MONTACHUSETT REGIONAL PLANNING COMMISSION
5 - CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION
6 - NORTHERN MIDDLESEX COUNCIL OF GOVERNMENTS
7 - MERRIMACK VALLEY PLANNING COMMISSION
8 - METROPOLITAN AREA PLANNING COUNCIL
9 - OLD COLONY PLANNING COUNCIL
10 - SOUTHEAST REGIONAL PLANNING & ECONOMIC DEVELOPMENT DISTRICT
11 - CAPE COD COMMISSION
12 - MARTHA'S VINEYARD COMMISSION
13 - NANTUCKET PLANNING & ECONOMIC DEVELOPMENT COMMISSION
14 - BELONGS BOTH TO MAPC & OCPC

MAINTENANCE

MassGIS maintains this datalayer. For contact information on the RPAs please see the page "Contacts/Where to Turn for More Information."

Massachusetts Highway Department Roads Datalayer
March 2000

OVERVIEW

This datalayer represents linework from the USGS 1:100,000 Roads Digital Line Graphs (DLGs) with additional linework from the Massachusetts Highway Department (MHD). Many of the new roads were provided to MHD by municipalities on various town-scale maps. Also, MHD made edits to existing DLG features. In addition, this layer includes extensive attribute information maintained by the MHD that has been linked to all features.

Eventually the linework in this datalayer will be replaced with 1:5,000 road centerlines that are being interpreted as part of the Digital Orthophoto development project. The MHD inventory and street attribute data will then be attached to the larger-scale mapping.

The **MHDROADS** layer is stored in the **QUAD** library. Coverages are tiled by 7.5-minute USGS Quad sheets and are named **MRD**. A subset of this layer comprising major roads has been created for smaller-scale mapping. See the MHD Major Roads datalayer description.

PRODUCTION

MassGIS received the Yearend 1999 MHD Road Inventory Data from the Bureau of Transportation Planning and Development and further processed the data to facilitate display, particularly in the MassGIS Data Viewer. Processing included: building routes for the items CSN, STREET_NAME, ROUTE, and ADMIN_TYPE; and building five subclasses of annotation (MAJOR2, MAJOR, LARGE, MEDIUM, and SMALL) which may be used for displaying street names depending on scale (in Arcplot use textset font prior to issuing the annotext command). In the data delivered to MassGIS, MHD includes items developed for this layer by the Department of Environmental Protection's GIS Group, including a classification scheme for plotting roads based on functional class and access control and adding the item CLASS to the arc attribute table (.aat) (see details below); adding the items STREET_NAME and RT-NUMBER to the .aat; and straightening the linework with the Arcedit STRAIGHTEN command, which eliminates most dimpled arc intersections.

ATTRIBUTES

Please refer to the digital metadata files for a complete listing of item descriptions and attributes.

The **MRD.AAT** (Arc Attribute Table) contains the following items:

COUNTY-CODE County Code

A =	Barnstable	H =	Hampshire
B =	Berkshire	I =	Middlesex
C =	Bristol	J =	Nantucket
D =	Dukes	K =	Norfolk
E =	Essex	L =	Plymouth
F =	Franklin	M =	Suffolk
G =	Hampden	N =	Worcester

SERIAL_NUMBER Used to uniquely identify a roadway segment within a given county

CLASS Used to designate a road based on functional classification and access; used for plotting
Classes are:

1 - Limited Access Highway	5 - Minor street or road
2 - Multi-lane Highway, not limited access	6 - Minor street or road (No assigned CSN)
3 - Other numbered route	7 - Track (from USGS DLGs)
4 - Major road - collector	8 - Trail (from USGS DLGs)

ADMIN_TYPE Based on AUTO-RT-SIGN from MRD.INV file
Types are:
1 - Interstate 2 - U.S. Federal 3 - State 0 - Local road
Roads with more than one sign type are preferenced in the above order.

RT-NUMBER Route number of the road type listed in ADMIN_TYPE

STREET_NAME Street name from the MRD.STREETS file (see details of this INFO table below)

** REDEFINED ITEMS **
CSN County Code + Serial Number Used to uniquely identify any roadway segment within the entire state

Note: This item is the link to the road inventory file (mrd.inv)

RELATED DATABASE FILES

The items for descriptions of street listings in the related file **MRD.STREETS** ("Streets File") are:

CITY_NUM	City or Town Number Abington = 1 ... Yarmouth = 351
RIN	Road Inventory Number. Used to uniquely identify any road within a given town
STREET_NAME	Street Name with Suffix
FRM-ST-NUM	From RIN
FRM-ST-NAME	From RIN name. Refers to either a road, a town or state line, a dead end, private property, or a cul-de-sac.
TO-ST-NUM	To RIN
TO-ST-NAME	To RIN name. See Item FRM-ST-NAME for description
CITY_RIN_H	City or Town Number + Road Inventory Number (RIN). Used to uniquely identify any road within the entire state. ***Note: This item is the link to the road inventory file (MRD.INV)***
** Redefined Items **	
CITY_RIN	CITY_NUM + RIN
OUTPUT	All fields

The **MRD.INV** ("Inventory File") file stores information on the road inventory. The items are:

1 **CITY_NUM**: City or Town Number Abington = 1 ... Yarmouth = 351

2 **RIN**: Road Inventory Number. Uniquely identifies each road within a given town

3 **FRM-ST-NUM**: From Road Inventory Number (RIN)

xxxx	=	RIN
Xxxx	=	Bordering town line, where X=1st letter of bordering town name and xxx=CITY_NUM
0000	=	Dead end
00CT	=	CT state line
00NH	=	NH state line
00NY	=	NY state line
00RI	=	RI state line
00VT	=	VT state line
8888	=	Private property
9999	=	Cul-de-sac

Note: From and To Road Inventory Number are for the entire road (RIN), not for the road segment (SERIAL_NUMBER).

4 **TO-ST-NUM**: To Road Inventory Number (RIN)
See Item # 3 (FRM-ST-NUM) for description

5 **ADMIN_SYS**: Administrative System

1	=	Massachusetts Highway Department
2	=	City or town accepted road
3	=	Metropolitan District Commission
4	=	Massachusetts Turnpike Authority
5	=	Massachusetts Port Authority
6	=	State Park or Forest
7	=	State institutional
8	=	Federal Park or Forest
9	=	County Institutional
0	=	Unaccepted by city or town
B	=	State college or university
C	=	US Department of Defense
D	=	US Army Corps of Engineers
E	=	Federal Institutional
F	=	Other Federal
G	=	Federal Bureau of Indian Affairs
H	=	Miscellaneous Bridges

6 **FEDAID_SYS**: National Highway System (NHS) Status

0	=	Not on NHS
1	=	NHS - Interstate
2	=	NHS - Strategic Defense Highway System (STRAHNET)
3	=	NHS - STRAHNET Connector
4	=	NHS - Other
5	=	NHS - Other - One-way pair
6	=	NHS - Other truck route exclusion
7	=	NHS connection to major intermodal terminal (proposed)

7 **FEDAID-RT-NUM**: Federal-Aid Route Number

8 **FEDAID-UR-DESIG**: Federal-Aid Urban/Rural Designation

1	=	Urban city
2	=	Urban town
5	=	Rural town

Note: A town may be partially urban and partially rural.

9 **FUNC-CLASS**: Functional Classification

0	=	Local
1	=	Interstate
2	=	Rural principal arterial and Urban extensions
3	=	Rural minor arterial and Urban extensions
4	=	Other Urban principal arterial
5	=	Urban minor arterial or Rural major collector
6	=	Urban collector or Rural minor collector

Note: Use urban/rural designation to interpret functional classification.

10 **AUTO-RT-NUMBER**: Auto Route Number
Interstate, US Highway, or State Numbered Highway route number
Note: If multiple routes exist on a section, the lowest number on the highest system is recorded (Interstate>US>State); Other routes under hierarchy are listed in Item # 11 (ALT-RT-NUMBER).

11 **ALT-RT-NUMBER**: Alternate Route Number(s)
All other routes under hierarchy of Item # 10
Note: Field begins and ends with a "+", and routes are separated by "+"s.

12 **D-SH-WID**: Left Side Right Shoulder Width for DIVIDED Roadway Only, in feet.

13 **D-SH-TYP**: Left Side Right Shoulder Type for DIVIDED Roadway Only
S = Stable - Unruttable compacted subgrade
U = Unstable shoulder
H = Hardened bituminous mix or penetration
Note: Null = no left side right shoulder OR not a divided roadway OR no data.

14 **DIV-L-SU-WID**: Left Side Surface Width of Travel Lanes for DIVIDED Roadway Only
0 = Not a divided roadway OR no data.
Note: Width of traveled way in feet, excluding shoulders/auxiliary lanes.

15 **MED-WID**: Median Width for DIVIDED Roadway Only
0 = Not a divided roadway OR No data
Note: Width in feet; coded as 99, if over 100 feet.

16 **DIV-L-NUM-TR-LA**: Left Side Number of Travel Lanes for DIVIDED Roadway Only
0 = Not a divided roadway OR No data

17 **CURBS**: Curbs
0 = None
1 = Left side only
2 = Right side only
3 = Both sides
4 = Along median only
5 = All curbs (divided highway)
Note: For urban sections only.

18 **L-SW-WID**: Left Sidewalk Width
0 = No left sidewalk OR No data
Note: For urban sections only; Width in feet.

19 **R-SW-WID**: Right Sidewalk Width
0 = No right sidewalk OR No data
Note: For urban sections only; Width in feet.

20 **STREET-OPERATION**: Street Operation
0 = No data
1 = One-way traffic
2 = Two-way traffic

21 **L-SH-WID**: Median Shoulders Width for DIVIDED Roadway OR Left Shoulder Width for UNDIVIDED Roadway
Note: Width in feet; for DIVIDED roadways, median shoulders are assumed to have the same width.

22 **L-SH-TYPE**: Median Shoulders Type for DIVIDED Roadway OR Left Shoulder Type for UNDIVIDED Roadway
See item # 14 (D-SH-TYP) for description
Note: For DIVIDED roadways, median shoulders are assumed to have the same type.

23 **SUR-WID**: Right Side Surface Width for DIVIDED Roadway OR Surface Width for Entire UNDIVIDED Roadway
0 = No data
Note: Coded as 99, if over 100 feet; Measurement of travelled way, excluding shoulders/auxiliary lanes.

24 **SUR-TYP**: Surface Type of Either DIVIDED or UNDIVIDED Roadway
0 = No data
1 = Unimproved, graded earth, or soil surface road
2 = Gravel or stone road
3 = Brick road
4 = Block road
5 = Surface-treated road
6 = Bituminous concrete road
7 = Portland cement concrete road
8 = Composite road; flexible over rigid
9 = Composite road; rigid over flexible or rigid over rigid ('white topping')
Note: For both DIVIDED and UNDIVIDED roadways.

25 **R-SH-WID**: Right Side Right Shoulder Width for DIVIDED Roadway OR Right Shoulder Width for UNDIVIDED Roadway
Note: Width in feet.

26 **R-SH-TYP**: Right Side Right Shoulder Type for DIVIDED Roadway OR Right Shoulder Type for UNDIVIDED Roadway
See Item # 14 (D-SH-TYP) for description

27 **UNDIV-RRWY-#TRLA**: Right Side Number of Travel Lanes for DIVIDED Roadway OR Total Number of Travel Lanes fo UNDIVIDED Roadway
0 = No data

28 **ACC_CON**: Access Control
0 = No control
1 = Full control
2 = Partial control

29 **TERRAIN**: Terrain
0 = No data
1 = Level

2 = Rolling
3 = Mountainous

30 **ROW-WID**: Right of Way Width
0 = No data
Note: Width in feet.

31 **SPEED_LIMIT**: Speed Limit
0 = No data
Note: Speed limit in miles per hour.

32 **ODOM-READ**: Cumulative Odometer Reading
Note: In hundredths of a mile (xx.xx); This value does not represent section length.

33 **URB-AREA**: Urbanized Area

URBANIZED AREAS

A =	Boston	H =	Pittsfield
B =	Brockton	I =	Providence-Pawtucket
C =	Fall River	J =	Springfield
D =	Fitchburg-Leominster	K =	Worcester
E =	Lawrence-Haverhill	L =	Taunton
F =	Lowell	M =	Hyannis
G =	New Bedford		

SMALL URBAN AREAS

1 =	Athol	R =	Plymouth
5 =	Spencer	S =	Greenfield
6 =	Ware	U =	Southbridge
O =	North Adams	V =	Clinton-Lancaster
Q =	Gardner-Templeton		

Note: If NULL, roadway section is in RURAL area.

34 **HPMS-CODE**: HPMS (Highway Performance Monitoring System) Code
0 = Not an HPMS section nor on a road that has an HPMS section
1 = Not an HPMS section but is on a road that has an HPMS section
2 = An HPMS section - special "sample" sections that require additional data (# of railroad crossings, percentage of truck traffic, etc.)

35 **AUTO-RT-SIGN**: Auto Route Signing
0 = Roadway is not signed as a numbered auto route
1 = Roadway is signed as an Interstate route
2 = Roadway is signed as a US Highway route
3 = Roadway is signed as a State route
Note: System hierarchy in Item # 10 (AUTO-RT-NUMBER) is used.

36 **SPECIAL_FUN**: Special Systems
0 = Not an addition to the Interstate system
1 = Addition to Interstate system (23 U.S.C. 139(c))
2 = Addition to Interstate system (23 U.S.C. 139(a))-approved before March 9, 1984
3 = Addition to Interstate system (23 U.S.C. 139(a))-approved on or after March 9, 1984
Note: Used to identify Special Highway System Categories.

37 **MEDIAN_TYPE**: Median Type for DIVIDED Roadway Only
0 = None
1 = Curbed
2 = Positive barrier
3 = Unprotected

38 **TYPE_URB_LOC**: Urban Location
0 = Not applicable (i.e., not a principal arterial nor in an urbanized area)
1 = Central Business District (CBD)
2 = High density business/commercial center (excluding CBD)
3 = Low density commercial
4 = High density residential (5,000 or more persons per square mile)
5 = Low density residential (less than 5,000 persons per square mile)
6 = Other urban area, including undeveloped land

39 **TOLL_RD**: Toll
1 = Not a toll road
2 = A toll road

40 **COUNTY-CODE**: County Code

A	=	Barnstable	H	=	Hampshire
B	=	Berkshire	I	=	Middlesex
C	=	Bristol	J	=	Nantucket
D	=	Dukes	K	=	Norfolk
E	=	Essex	L	=	Plymouth
F	=	Franklin	M	=	Suffolk
G	=	Hampden	N	=	Worcester

41 **SERIAL_NUMBER**: Serial Number
Uniquely identifies each roadway segment within a given county

42 **CSN_H**: County Code + Serial Number (with blanks)
Uniquely identifies each roadway segment within the entire state
Note: This item is the link to the town-level coverages (MRD's).

43 **CSN_ZF**: County Code + Serial Number (zero filled)
Uniquely identifies each roadway segment within the entire state

Note: This item is the link to the town-level coverages (MRD's)..

44 **CITY_RIN_H**: City or Town Number + Road Inventory Number (zero filled)
Uniquely identifies each road within the entire state
Note: This item is the link to the street listing file (MRD.STREETS).

45 **MILES**: Length of street segment in miles.

46 **STREET_NAME**: Street name, from the MRD.STREETS file.

** REDEFINED ITEMS **
CSN: County Code + Serial Number (with blanks).
CITY_RIN: CITY_NUM + RIN
D-SH-WT: D-SH-WID + D-WID-TYP
L-SH-WT: L-SH-WID + L-WID-TYP
R-SH-WT: R-SH-WID + R-WID-TYP
OUTPUT: All fields

MAINTENANCE

MassGIS and MHD are maintaining this layer.

MHD Major Roads, Routemarker Locations, and Highway Exits Datalayers
March 2000

OVERVIEW

This datalayer represents the "major roads" in the Commonwealth from the Massachusetts Highway Department (MHD) Roads datalayer. Four classes of road are included: Limited Access Highways (such as Interstates with on- and off-ramps as the only means of access), Multi-lane Highways without limited access, Other Numbered Highways (such as state and Federal routes that are not included in the previous two categories), and Major Road-Connectors (non-numbered routes that connect numbered routes). These major roads are stored as one statewide coverage; the coverage name is **MAJRDMHD** and the STATE library layer name is **MAJ_RD_MHD**.

Another statewide layer, **MHDRDPTS**, is a point coverage that may be used for plotting route shields that have the look of the actual highway signs (i.e. red, white and blue Interstate; U.S. shields; boxes for State routes).

A third related statewide layer, **EXITS**, is a point coverage that includes the location and ID number of major highway interchanges.

ATTRIBUTES

Please refer to the digital metadata files for a complete listing of item descriptions and attributes.
The **MAJRDMHD.AAT** contains the following items:

CLASS	Used to designate a road based on functional classification and access; used for plotting Classes are: 1 - Limited Access Highway 2 - Multi-lane Highway, not limited access 3 - Other numbered route 4 - Major road - collector
ADMIN_TYPE	Based on AUTO-RT-SIGN from MRD.INV road inventory file Types are: 1 - Interstate 2 - U.S. Federal 3 - State 4 - Major Road-Connector Roads with more than one sign type are preferenced in the above order.
RT-NUMBER	Principal route number of the road type listed in ADMIN_TYPE
ALT-RT-NUMBER	Route number of the road type listed in ALT-ADMIN_TYPE
ALT-ADMIN_TYPE	Alternate ADMIN_TYPE by ADMIN_TYPE hierarchy listed above

The **MHDRDPTS.PAT** contains the following items:

RT-NUMBER	4	4	C	-	RTNO	Route Number
ALT-RT-NUMBER	4	4	C	-		Alternate Route Number
RT-ID	4	4	I	-		Markerset symbol number for RT-NUMBER
ART-ID	4	4	I	-		Markerset symbol number for ALT-RT-NUMBER
MARKER	3	3	I	-		Code for scale dependency when plotting markers
FUNC-CLASS	1	1	I	-		Functional class for road of RT-NUMBER, from MHD

The **EXITS.PAT** contains the following items:

INTMARK-ID	4	5	B	-	Markersymbol number in custom markeset used for plotting
ROUTE	4	4	C	-	Route Number of major highway on which the exit is located

DATA DISPLAY

To plot the MHDRDPTS routemarker locations layer using Arcplot, use the markerset solidshld.mrk; a special font fnt029 must be located either locally or in the $archome/igl63exe directory. Issue the pointmarkers command and use the RT-ID (route number) or ART-ID (alternate route number) item, which matches the appropriate symbol in the solidshld.mrk markerset. The font and markerset files may be downloaded from the MassGIS Web site at http://www.state.ma.us/mgis/majrdmhd.htm.

To plot these points in ArcView with appropriate route shield markers, do the following:

1. Download a set of route shields created for Massachusetts from the ESRI Scripts page at http://gis.esri.com/arcscripts/details.cfm?CFGRIDKEY=-189183665. Jim Mossman of Data Deja View developed this ArcView palette file.
2. Follow the instructions included in the .zip file for installation of the fonts onto a Windows PC.
3. Download mhdrtid.avl from http://www.state.ma.us/mgis/mhdrtid.avl and use this MassGIS-produced ArcView legend file for symbolization.
4. Add the Route Location theme in ArcView and load the mhdrtid.avl legend, symbolizing on the RT-ID item.
5. You may want to adjust the size of the markers or select a subset based on the MARKER field to avoid too many shields plotting, depending on your map scale.

Please note that the locations of these points have been chosen to optimize display and do not represent actual roadside locations of route signs.

MAINTENANCE

MassGIS and MHD are maintaining this layer.

Trains Datalayer
June 1998

OVERVIEW

The Central Transportation Planning Staff updated and enhanced railroad linework distributed by the United States Geological Survey (USGS) as 1:100,000 Digital Line Graphs (DLGs). CTPS added several attributes pertaining to type of service, MBTA Commuter Rail status and stations, rail line ownership, and freight and passenger operation. MassGIS distributes these data as a single statewide coverage called **TRAINS**.

The linework is generally excellent, although some railroads are discontinuous (not perfectly edgematched) at USGS 1:100,000 quadrangle boundaries. Other tranportation linework that appears on the USGS 1:100,000-scale maps, such as pipelines and transmission lines, are included in the **TRNSLNS** coverage; please see the Transmission Lines datalayer description for more details.

PRODUCTION

In addition to the new attribute coding mentioned above (see details of tables below), some linework obtained from a variety of sources (see below) was added to the DLGs by CTPS staff. CTPS also created routes and sections from the arcs for the Commuter Rail lines. MassGIS performed quality checking on the data, which included minimal updating of Commuter Rail station names. Using the Arcplot commands ANNOCOVERAGE and NODETEXT, MassGIS created three subclasses of annotation from the STATION item in the node attribute table: ANNO.COMM for large scale maps, and ANNO.LARGE and ANNO.LARGE2 for regional scale maps. In each subclass, Level 1 is for active stations, Level 2 for proposed stations.

ATTRIBUTES

The **TRAINS** arc attribute table (.AAT) includes the following items:

TYPE	2	2	I	-			see Table 1 below
SOURCE	5	5	C	-			see Table 2 below
COMMRAIL	1	1	C	-			see Table 3 below
OWNERSHIP	10	10	C	-			see Table 4 below
FREIGHT_OP	10	10	C	-			see Table 5 below
PASS_OP	11	11	C	-			see Table 6 below
COMM_LINE	40	40	C	-			see Table 7 below
LINE_BRNCH	20	20	C	-		LINE_BRANCH	see Table 8 below
VALPLANNUM	6	6	N	2		VAL_PLAN_NUM	
VALPLANOWN	10	10	C	-		VAL_PLAN_OWN	see Table 9 below

Concatenated code attributes from the original DLG file MAJOR/MINOR pairs, which had been included in an earlier version of this coverage in the item MINOR_NUM, have been dropped from the .AAT.

The **TRAINS** node attribute table (.NAT) includes the following items:

STATION	25	25	C		STATION_NAME	MBTA Commuter Rail Station name
LOT_NUMBER	3	3	I	-		Code not currently used; not reliable
C_RAILSTAT	1	1	C	-	COMMRAIL_STATUS	see Table 3 below
BIKE_TRAIL	40	40	C	-		only Minuteman

The **TRAINS** Route Attribute Table (.RATTRAIN) includes the following items:

TRAIN-ID	4	5	B	-		see Table 10 below
ARCLENGTH	4	12	F	3		
MEASURELEN	4	12	F	3	MEASURELENGTH	
NUMSECTION	4	5	B	-	NUMSECTIONS	
LINE_BRNCH	50	50	C		LINE_BRANCH	

The **TRAINS** Section Table (.SECTRAIN) includes the following items:

ROUTELINK#	4	5	B	-
ARCLINK#	4	5	B	-
F-MEAS	4	12	F	3
T-MEAS	4	12	F	3
F-POS	4	12	F	3
T-POS	4	12	F	3
TRAIN#	4	5	B	-
TRAIN-ID	4	5	B	-
RATIO	4	12	F	3

The following tables detail code descriptions of items.

Table 1 - TYPE (.AAT) Type of service

1	Active
2	Multi use, Active rail and recreation
3	Abandoned Rail Line
4	Abandoned Rail Line in Right of Way in Public Ownership
5	Activity status is unknown
6	Out of Service
7	Recreation, hiking or biking
8	Out of state, to Bradley, Green and Manchester airports.

Table 2 - SOURCE (.AAT) Source of linework

DLG	Original USGS 1:100000 Digital Line Graphs
CTPS	Line work or data items altered by CTPS staff
1890	1890 Topographical maps of Massachusetts (MA publisher)
1938	1938 General Highway Maps (MA DPW publisher)
VPmap	Valuation Section Maps of 1917 of NY,NH&H,and,Central NE Lines and circa. 1970's Boston and Maine Valuation Section Map

Table 3 - COMMRAIL (.AAT) or C_RAILSTAT (.NAT) MBTA Commuter Rail status

Y	Active MBTA commuter line
P	proposed extensions

Table 4 - OWNERSHIP (.AAT) Ownership of line

AMTRAK	AMTRAK
B&M	Boston and Maine
CONRAIL	Consolidated Railroad Corporation
CT	out of state, Connecticut
DEM	MA Department of Environmental Management
EOTC	MA Executive Office of Transportation and Construction
FEDERAL	United States Gov't--DOD and Parks
G&U	Grafton and Upton Railroad
HOUSATONIC	Housatonic Railroad
LOCAL	City or Town
MBTA	Massachusetts Bay Transportation Authority
MDC	Metropolitan District Commission
MTA	Massachusett Turnpike Authority
MWRA	Massachusetts Water Resources Authority
NECR	Northeast Corridor Railroad- AMTRAK
NH	out of state, New Hamphire
P&W	Providence and Worcester Railroad
PI	Private Industry
PRIVATE	Private Owner
PV	Pioneer Valley
RI	out of state, Rhode Island
UTILITY	Utility

Table 5 - FREIGHT_OP (.AAT) Freight Operation

BC	Bay Colony Railroad
CONRAIL	Consolidated Railroad Corporation
CV	Central Vermont Railway
G&U	Grafton and Upton Railroad
HOUSATONIC	Housatonic Railroad
MCR	Massachusetts Central Rail Railroad
P&W	Providence and Worcester Railroad
PV	Pioneer Valley Railroad
QB	Quincy Bay Terminal Company
STRC	Springfield Terminal Railway Company

Table 6 - PASS_OP (.AAT) Passenger Operation

AMTRAK	AMTRAK
AMTRAK	AMTRAK summer line to Cape
AMTRAK/MBTA	AMTRAK and MTBA share service
MBTA	Massachusetts Bay Transportation Authority

Table 7 - COMM_LINE (.AAT) MBTA Commuter Rail line

att-sto	Attleboro/Stoughton Line
fair	Fairmont Line
fitch	Fitchburg/South Acton Line
fram-wor	Framingham/Worcester Line
frank	Franklin Line
hav	Haverhill/Reading Line
low	Lowell Line
ips-roc	Rockport/Ipswich Line
nee	Needham Line

Where more than one line uses same track, separated by commas

Table 8 - LINE_BRNCH (.AAT) Main line or Branch

B&A_WORCESTER
DORCHESTER BRANCH
EASTERN ROUTE
ESSEX BRANCH
FITCHBURG
FRANKLIN
GEORGETOWN BRANCH
GLOUCESTER
KINGSTON BRANCH
MERRIMAC BRANCH
MIDDLEBOROUGH MAIN
MIDDLEBORUOGH LINE
NEEDHAM BRANCH
NEW HAMPSHIRE
NEWBURYPORT BRANCH
PLYMOUTH BRANCH
SALEM & LAWRENCE
SALISBURY BRANCH
SHORE LINE
STOUGHTON BRANCH
WESTERN ROUTE
WILDCAT
WOBURN BRANCH
CHARLES RIVER (FREIGHT)

Table 9 - VALPLANOWN (.AAT) Owner at the time of 1917 Valuation

B&A	Boston and Albany Railroad
B&M	Boston and Maine Railroad
B&P	Boston and Providence Railroad
CHATHAM RA	Chatham Railroad
CV	Central Vermont Railroad
G&U	Grafton and Upton Railroad
MANCHESTER	Manchester Railroad
N&W	Norwich and Worcester Railroad
NYNH&H	New York, New Haven and Hartford Railroad
OLD COLONY	Old Colony Railroad
P&W	Providence and Worcester Railroad
SALEM & LA	Salem and Lawrence Railroad

Table 10 - TRAIN-ID (.RATTRAIN) Dynamic Segmentation Route Attribute Table

Train-id	
1	SHORE LINE
2	NEW HAMPSHIRE
3	FITCHBURG
4	EASTERN ROUTE
5	WESTERN ROUTE
6	GLOUCESTER BRANCH
7	WILDCAT BRANCH
8	DORCHESTER BRANCH
9	NEEDHAM BRANCH
10	B&A WORCESTER
11	MIDDLEBOROUGH MAIN LINE
12	PLYMOUTH BRANCH
13	KINGSTON BRANCH
14	STOUGHTON BRANCH
15	FRANKLIN BRANCH
16	CHARLESRIVER BRANCH
17	BRAINTREE SECONDARY
18	BUZZARDS BAY SECONDARY
19	WEST HANOVER SECONDARY
20	NANTASKET SECONDARY

MAINTENANCE

The Central Transportation Planning Staff will update the datalayer as needed.

MBTA Rapid Transit Datalayer
June 1998

OVERVIEW

This datalayer comprises the four subway and streetcar lines in the Massachusetts Bay Transportation Authority's rapid transit rail network. The four 'T' lines - Blue, Green, Orange, and Red - are represented with linework. Station names are included in nodetext and annotation. The coverage was developed by the Central Transportation Planning Staff (CTPS) and is stored as a single statewide layer called **MBTA**.

PRODUCTION

Original linework was acquired from 1:100,000 USGS Digital Line Graph transportation data, and updates and additions were made by CTPS staff. MassGIS performed further quality checking and updating of the station names. Annotation was created from the STATION item in the node attribute table with the Arcplot ANNOCOVERAGE and NODETEXT commands and textset FONT.TXT, and was sized and placed for optimum cartographic display.

ATTRIBUTES

Each **.AAT** (arc attribute table) has the following items:

SOURCE	5	5	C	-	-	Either DLG or CTPS
LINE	6	6	C	-	-	BLUE, GREEN, ORANGE, or RED
LINE_CO	3	3	I	-	-	Color symbol number

Each **.NAT** (node attribute table) has the following items:

STATION	25	25	C	-	-	Name of T Station
LOT_NUMBER	3	3	I	-	-	First phase of construction, currently incomplete
TYPE	10	10	C	-	-	Surface Green and Red Line trolleys where coded

MAINTENANCE

This datalayer will be updated as needed by the Central Transportation Planning Staff.

Transmission Lines Datalayer
December 1995

OVERVIEW

The U.S. Geological Survey (USGS) distributes Digital Line Graphs (DLG) from its 1:100,000-scale maps showing pipelines, transmission lines, and other miscellaneous transportation features. MassGIS assembled these data into the statewide coverage **TRNSLNS**, consisting of all the transportation features identified by USGS other than railroads and vehicle roadways and which appear on the 1:100,000 USGS quadrangle sheets.

Although the pipelines and transmission lines appear on maps, they are not necessarily in active use. The linework is generally excellent, although MassGIS has noted that some lines are discontinuous (not perfectly edgematched) at USGS 1:100,000 quadrangle boundaries. Railroad transporation features are included in the **TRAINS** coverage; please see its datalayer description for details.

ATTRIBUTES

The **TRNSLNS** arc attribute table (.AAT) includes the following concatenated code attributes from the original DLG file MAJOR / MINOR pairs:

MINOR_NUM	DESCRIPTION
201	PIPELINE
202	POWERLINE
204	SKI LIFT/TRAMWAY
401	SUBSTATION
403	LANDING STRIP/AIRPORT
201205	PIPELINE ARBITRARY EXTENSION
202205	POWERLINE ARBITRARY EXTENSION

More information about the 1:100,000 DLG files including the major / minor code descriptions can be found in the USGS National Mapping Division publication, *Digital Line Graphs from 1:100,000-Scale Maps*.

Long Distance Trails Datalayer
July 1999

OVERVIEW

The Long Distance Trails Datalayer is a line coverage representing trails that are longer than 25 miles. The data was created for the purpose of regional planning and mapping by the Massachusetts Department of Environmental Management and was modified for DEM by the University of Massachusetts in 1997. At scales of 1:50,000 or smaller the data is reliable for all trails; between 1:50,000 and 1:25,000 the data quality of some trails may be significantly inaccurate; for scales greater than 1:25,000 the quality of most trails will be significantly inaccurate. The dataset is stored as a single statewide layer named **LDTRAILS**.

PRODUCTION

All data was digitized from paper maps, most coming directly from USGS Topographic Quadrangles.

ATTRIBUTES

The .AAT (arc attribute table) contains the following item:

NAME1 The name of the long distance trail

MAINTENANCE

The Department of Environmental Management is maintaining this datalayer. The data may be used in conjunction with the *Rail Trails Datalayer,* also produced by DEM.

Rail Trails Datalayer
July 1999

OVERVIEW

The Rail Trails Datalayer is a line coverage representing abandoned railroad rights-of-way and public bike trails that use the rights-of-way. The dataset was created by the Massachusetts Department of Environmental Management for the purpose of regional planning and mapping. At scales of 1:50,000 or smaller the data is reliable for all trails; between 1:50,000 and 1:25,000 the data quality of some trails may be significantly inaccurate; and for scales greater than 1:25,000 the quality of most trails will be significantly inaccurate. This data set is stored as a single statewide layer named **RAILTRAILS** (coverage **RAILTR**).

PRODUCTION

The data was originally modified by DEM from the MassGIS Railroads Datalayer; it has since been modified for DEM by the University of Massachusetts in 1997. All modifications were made using information from various paper maps, and much of the data came directly from USGS Topographic Quadrangles.

ATTRIBUTES

The **.AAT** (arc attribute table) contains the following items:

Trails	A = Abandoned, E = Existing, C= Considered
Owner	Owner's name
Prev_owner	Previous owner's name
Linename	The name of the old line or existing trail
Manager	If different from owner
Status_Man	S = State M= Municipal
Status_Own	S= State M= Municipal

MAINTENANCE

The Department of Environmental Management is maintaining this datalayer. The data may be used in conjunction with the Long Distance Trails Datalayer, also produced by DEM.

Contours Datalayer
December 2000

OVERVIEW

The Contours datalayer represents a combination of both 1:25,000 USGS Digital Line Graph (DLG) 3 meter/10 foot contours and 3-meter contours created from Digital Terrain Model (DTM) data points collected during the production of the 1:5,000 Black and White Digital Orthophoto images. Wherever DTM-based data is available, the generated lines supersede the DLG contours. MassGIS obtained the USGS 1:25,000 Hypsography Digital Line Graph from the USGS National Mapping Division. These files were converted into ARC/INFO coverages and projected into the MA State Plane Coordinate System. All contour lines appearing on the USGS quadrangle sheets are included in these coverages. USGS data are **NOT** available for many quads nor are they necessarily available for entire quadrangles if generated contours exist for the same area. The data are stored in the OQ library. Layer name is **CONTOURS**; each coverage is named **HP**.

Arc/INFO TINCONTOUR was used to create the DTM-based contours. Breaklines coded "hard" and "soft" were used in combination with .GEN files containing the "mass" and "spot" DTM points. All of these data were extracted from the original DTM files collected on stereo analytic plotters. The Orthophoto Index Grid coverage was used as a CLIP coverage as the DTM points overlap 5-10 percent in both directions. These 3-meter contours are accurate to +- 1.5 meters.

ATTRIBUTES

The .AAT has three items: **MINOR_NUM, ELEV_M,** and **ELEV_FT**. **MINOR_NUM** is the concatenation of the original Minor codes contained in the DLG .ACODE files. The 3-digit codes that comprise **MINOR_NUM** represent topographic contour classifications such as depressions, underwater depths, and carrying contours (contours with more than one elevation, as happens along cliffs). More information about the 1:25,000 DLG's including detailed descriptions of the Major/Minor code scheme can be found in the USGS National Mapping Division Publication, *Digital Line Graphs from 1:24,000-Scale Maps* (Massachusetts is the only state which has quads produced using the metric system and a 1:25,000 scale). All generated contours are simply coded MINOR_NUM = 200. **ELEV_M** contains the elevation value in meters. For the few DLG quadrangles which are from 1:24000 scale quads, the contour value originally stored in feet was also converted and rounded to meters. Those elevations originally stored in meters are converted and rounded to feet and also stored in **ELEV_FT.**

The following table lists **MINOR_NUM** values and their descriptions as listed by the USGS plus the code for neatlines, 999. Note that these values may be concatenated in the **MINOR_NUM** item.

200	Ordinary contour
201	Carrying contour
202	Supplementary contour
204	Amended contour
205	Bathymetric contour
206	Assumed bathymetric contour
208	Closure line Approximate
611	Depression
613	Underwater
614	Best estimate
999	Quad neatline

A fourth item, **SRC**, indicates whether a feature is from a USGS DLG file (USGS) or a generated contour (DOQ).

MAINTENANCE

MassGIS is maintaining this datalayer. As new DTM point data are available, 3 meter contours will be generated and incorporated into this layer. Eventually all USGS DLG lines will be replaced by generated contours. DTM contours are available for areas covered by available 1:5000 orthophotos.

Contours (1:250,000) Datalayer
February 1990

OVERVIEW

The 1:250,000 Hypsography datalayer represents elevation contours at a 30-ft. interval. It was created by MassGIS from Defense Mapping Agency data as reformatted by the USGS National Mapping Division. The layer is stored in the BASIN library. The layer name is **CONTOURS250**; each coverage is named **HP250K** (*refer to the Basin Index map at the back of this document).*

MANUSCRIPT

The source data are the digital elevation models created by the Defense Mapping Agency at a nominal 1:250,000 scale. The original digital elevation files consist of a one degree square array of elevation values at 3 arc-second intervals, (approx. 200 ft.), measured in integer meters. This source data has been classified as level 1 by the USGS, which means that the root mean square error of any sample point is expected to be less than one-half contour interval. In practice, this means that a spot elevation interpolated from contours plotted at an appropriate interval (not less than 20 ft.) would probably be within 30 ft. of its 'true' elevation. Note that in areas where the elevation value is most rapidly changing the vertical error is likely to be larger, but the horizontal distance to a point at the elevation shown will tend to remain the same.

METHODOLOGY

The original files were too large to process using the Arc/INFO **DEMLATTICE** command, so they were first broken up into smaller files and formatted as Arc/INFO .svf files using FORTRAN routines. Arc/INFO lattice files were then created using the **GRIDLATTICE** command and a low-pass **FILTER** was run on them to 'smooth' the data. The **LATTICEOPERATE** command was used to convert from meters into feet. Contour coverages were created from the lattice files using a contour interval of 30 feet, which was consistent with the input scale of the data. The contour coverages were then **PROJECTED** into state plane feet, and rounded off to feet. The coverages have since been projected into the Massachusetts State Plane Coordinate System, NAD83 meters.

ATTRIBUTES

This datalayer has an **.AAT** (arc attribute table) with the attribute CONTOUR_FT.

NOTE: It is essential that these data be used at a regional scale consistent with the scale of the source data which is 1:250,000. Not all the contours will line up with such MassGIS data layers as the shoreline, the hydrography or the basin lines. Caution should be exercised in producing graphic output. Some significant features are missing from the original data.

Digital Orthophoto Points Datalayer
December 2000

OVERVIEW

The points in this layer were created using Digital Terrain Model (DTM) data points collected during the production of the 1:5000 Black and White Digital Orthophoto images. These points are accurate to National Map Accuracy Standards (+- 1.5 meters). They are tiled by the Orthophoto Quad Index. Each coverage in the **ELEVATIONS** layer, stored in the OQE library, is named **P**.

PRODUCTION

The points were produced using the Arc/INFO GENERATE command. The INPUT file was a .GEN file produced with an awk script that contained DTM point coordinates. The items NUMBER and SPOT were added to the .PAT using JOINITEM; their values were obtained from a .DAT file produced with the same awk script. Finally the item SFTYPE was set to 1 for mass. All of these data were extracted from the original DTM files collected on stereo analytic plotters. The points are tiled by the Orthophoto Index Grid coverage, which was used as a CLIP coverage as the DTM points overlap 5-10 percent in both directions. Points are available for areas covered by available 1:5000 orthophotos.

ATTRIBUTES

Each **.PAT** (point attribute table) contains the following items:

17	SFTYPE	Surface feature type
18	NUMBER	
22	SPOT	Elevation
26	OQ-ID	Source orthophoto tile number

MAINTENANCE

This datalayer is maintained by MassGIS.

Digital Orthophoto Breaklines Datalayer
December 2000

OVERVIEW

The breaklines in this layer were created using Digital Terrain Model (DTM) data points collected during the production of the 1:5000 Black and White Digital Orthophoto images. These breaklines are accurate to National Map Accuracy Standards (+- 1.5 meters). They are tiled by Orthophoto Index Grid sheets in the OQ library. The layer is named **BREAKLINES**; each coverage is named **L**. For further discussion of the orthophoto and index datalayers please refer to their description pages.

PRODUCTION

The breaklines were produced using the Arc/INFO GENERATE command. The INPUT file was a .GEN file produced with an awk script that contained DTM point coordinates coded either "hard" or "soft". All of these data were extracted from the original DTM files collected on stereo analytic plotters. The Orthophoto Index Grid coverage was used as a CLIP coverage as the DTM points overlap 5-10 percent in both directions. Breaklines are available for areas covered by available 1:5000 orthophotos.

ATTRIBUTES

Each coverage has a standard **.AAT** (arc attribute table).

MAINTENANCE

This datalayer is maintained by MassGIS.

Land Use Datalayer
May 2001

OVERVIEW

The MassGIS statewide 1:25,000 land use datalayer has 37 land use classifications interpreted from 1:25,000 aerial photography taken in 1971, 1985, and in some areas, 1990, 1991, 1992, 1995, 1997 and/or 1999. Coverage is complete statewide for the years 1971 and 1985. About half of the state has been updated further to represent land use for various years from 1990 to 1999. This datalayer is stored in the TOWN library; the layer is named **LAND USE** and the individual community coverages are named **LUS**.

The online land use status map at http://www.state.ma.us/mgis/st_lus.htm displays the most up-to-date year of landuse data for each town, including updates for 1999.

The year of most recent photography used for land use data interpretation is stored in a single statewide coverage called **LUSTAT**. This layer was necessitated by the fact that some towns contain partial coverage for a certain year, which eliminated the one-to-one link between town-ID and year.

PRODUCTION

Photointerpretation and automation were done by the Resource Mapping Project at the University of Massachusetts, Amherst. The RMP staff aggregated the 104 classes of their original 1971 interpretation into 21 categories and digitized the data into individual community digital coverages using a PC version of Arc/INFO software. The RMP staff then visually compared the 1971 photography and 1985 photography and produced a digital map of only 1971-85 change for each community. Interpretation was made from 1:40,000 9"x 9" color infrared photos flown in summer 1985. Southeastern Mass was flown in September 1984. The flight and photography were funded by the Massachusetts Dept. of Environmental Management for another project. Several additional categories of land use were added for parts of Massachusetts. Ten communities in the Southeastern Regional Planning & Economic Development District (SRPEDD) west of Buzzards Bay plus Bourne and Falmouth have a total of 28 land use classes. The 28 classes include the original 21 categories plus 23,24,25,26,27,28 and 29 (see Code Definitions on the next page).

In 1990, the Cape Cod Commission funded an update of Cape Cod. These data are categorized into 26 land use classifications, expanding the original codes to include 23,26,29 and 30. These additional codes, along with the original 21, are listed in LU37_CODE. Massachusetts Water Resources Authority (MWRA) funded land use interpretation in 1991 for 14 towns. The 33-code scheme for this update includes codes 23,24,29,30,31,32,33,34,35,36 and 37 in addition to the original 21 codes. The Executive Office of Transportation and Construction (EOTC) also funded a 1991 update for 113 towns using the same set of codes as the MWRA except for code 37. The minimum mapping unit used was one acre. These towns that have been updated are listed below.

Each land use coverage was plotted at a scale of 1:25,000 by the RMP before delivery to MassGIS. MassGIS used a workstation version of Arc/INFO to combine data from different years. The process of combining the data from different years created some 'sliver polygons'. These result when a theoretically coterminous line in each coverage is actually offset due to it having been digitized twice, e.g. the shore of a lake. Many of these slivers have been eliminated by screening for an area/perimeter ratio beyond normal limits. Some slivers remain. They have the correct coding, but should actually be merged with an adjacent polygon.

NOTE: This project was funded by the Massachusetts Executive Office of Environmental Affairs (EOEA), the Executive Office of Transportation and Construction, Massachusetts Water Resources Authority and several regional planning agencies. Photointerpretation and digitizing were completed by the UMASS-Amherst Department of Forestry Resource Mapping Project (RMP).

In 1999, EOEA funded the acquisition of statewide 1:25,000 aerial color infrared photography for use in the latest round of land use interpretation. Again, photointerpretation and digitizing were completed by the UMASS Department of Forestry Resource Mapping Project. Statewide data processing by UMASS based on the 1999 photography is expected to be completed by the end of June 2001. Release of the data by MassGIS will follow a quality assurance/quality checking routine.

ATTRIBUTES

MassGIS created a standard Arc/INFO Polygon Attribute Table (LUS.PAT) with the most recent available land use for each town. Each .PAT contains the following attributes:

TILE-NAME	Town-ID
LU_ID	Unique polygon ID for the town
LU21_CODE	21 category land use code
LU37_CODE	37 category land use code
YEAR	Date of most recent data
RELATE-ID	A redefined item combining the TILE-NAME and RELATE-ID items. This item uniquely identifies each polygon within the state.

Therefore, towns with land use up to 1985 will have their 1985 land use codes in the items LU21_CODE and LU37_CODE; towns updated to 1990 through 1997 will have the updated code in these items. It is important to note that even though both the 21- and 37-class items are in each .pat, the LU37_CODE item may be different only for towns updated beyond 1985. In towns current to 1985, the codes for LU21_CODE and LU37_CODE will be the same.

LAND USE CODE DEFINITIONS

The two land use code items in the table represent two classifications of land use. The 21-category classification aggregates the categories in the 37-category classification as follows:

CODE	ABBREV	CATEGORY	DEFINITION
1	AC	Cropland	Intensive agriculture
2	AP	Pasture	Extensive agriculture
3	F	Forest	Forest
4	FW	Wetland	Nonforested freshwater wetland
5	M	Mining	Sand, gravel & rock
6	O	Open Land	Abandoned agriculture, power lines, areas of no vegetation
7	RP	Participation Recreation	Golf, tennis, playgrounds, skiing
8	RS	Spectator Recreation	Stadiums, racetracks, fairgrounds, drive-ins
9	RW	Water Based Recreation	Beaches, marinas, swimming pools
10	R0	Residential	Multi-family
11	R1	Residential	Smaller than 1/4 acre lots
12	R2	Residential	1/4 - ½ acre lots
13	R3	Residential	Larger than ½ acre lots
14	SW	Salt Wetland	Salt marsh
15	UC	Commercial	General urban, shopping center
16	UI	Industrial	Light & heavy industry
17	UO	Urban Open	Parks, cemeteries, public & institutional green space, vacant undeveloped land
18	UT	Transportation	Airports, docks, divided highway, freight storage, railroads
19	UW	Waste Disposal	Landfills, sewage lagoons
20	W	Water	Fresh water, coastal embayment
21	WP	Woody Perennial	Orchard, nursery, cranberry bog
22		No Change	Code used by MassGIS during quality checking

The additional categories in LU37_CODE are:

CODE	ABBREV	CATEGORY
23	CB	Cranberry bog (part of #21)
24	PL	Powerlines (part of #6)
25	RSB	Saltwater sandy beach (part of #9)
26	RG	Golf (part of #7)
27	TSM	Tidal salt marshes (part of #14)
28	ISM	Irregularly flooded salt marshes (part of #14)
29	RM	Marina (part of #9)
30	-	New ocean (areas of accretion)
31	UP	Urban public (schools, churches, and government offices) (part of #17)
32	TF	Transportation facilities (part of #18)
33	H	Heath (part of #6)
34	CM	Cemeteries (part of #17)
35	OR	Orchard (part of #21)
36	N	Nursery (part of #21)
37	-	Forested Wetland (part of #3)

All land use categories were aggregated from 104 categories originally defined in 1971. Further information on them can be obtained from Professor William MacConnell at the Dept. of Forestry, University of Massachusetts, Amherst.

HISTORICAL LAND USE

To store the older land use codes, a related "Polygon History table" (LUS.PHS) contains the land use for all available years for each polygon. Each .PHS table (stored in the town tile workspace if you are using data in Librarian format) relates to its town's .PAT on the redefined item RELATE-ID (a unique id comprising TILE-NAME and LU_ID). A statewide version of the LUS.PHS table is also maintained and is stored in the Town library's 'database' workspace. When distributing data as export files, the LUS<town-id>.PHS is included in the .e00 file. Shapefile .exe files contain the town-based .PHS table named lus<town-id>ph.dbf.

TILE-NAME	Town-ID
LU_ID	Unique polygon ID for the town
LU21_CODE	21-category land use code (for YEAR)
LU37_CODE	37-category land use code (for YEAR)
YEAR	Date of historical data (Year of aerial photography used in land use compilation - 1971, 1985, 1990, 1991, 1992, 1995, 1997, 1999)
RELATE-ID	A redefined item combining the TILE-NAME and LU_ID items. This item uniquely identifies each polygon within the state. In shapefile versions of the .PHS files this item is named RELATE_ID and is not redefined.

Here is an example of how to relate from a coverage .PAT to the .PHS table to determine historical land use, using town #105 (Georgetown) as an example. In the LUS.PAT we find this record (polygon 355, indicated by the LU_ID item):

TILE-NAME	LU_ID	LU37_CODE	LU21_CODE	YEAR	**RELATE-ID**
105	355	32	18	1991	**105 355**

The RELATE-ID (highlighted in boxed cells) is this polygon's unique record within the state. Since Georgetown's landuse has been updated to include 1991 data, there are three records for each polygon in the LUS.PHS table - one for each year for which land use has been recorded (1971, 1985, and 1991). Using the RELATE-ID as the common field one can relate to the LUS.PHS table, where we find these three corresponding records:

TILE-NAME	LU_ID	LU37_CODE	LU21_CODE	YEAR	**RELATE-ID**
105	355	3	3	1971	**105 355**
105	355	2	2	1985	**105 355**
105	355	32	18	1991	**105 355**

Once this relate is established, you may determine the landuse codes for this polygon for 1971 and 1985. In the example above, polygon 355 was coded 3 (forest) in 1971 and 2 (pasture) in 1985. Also found here are the codes for 1991, which match the codes in the .PAT. Because the 37 classification codes are available only for post-1985 landuse data, the more specific code 32 (transportation facility) is used for the LU_37 item, whereas 18 (transportation) is used for LU21_CODE in the record where YEAR = 1991. Accordingly, the records for 1971 and 1985 show no difference for LU37_CODE and LU21_CODE within each year.

When using the .PHS table in workstation ArcInfo (e.g. ArcPlot), you may need to use the RESELECT command to select a particular YEAR prior to establishing a relate. In ArcInfo 8x, ArcView, or other GIS software packages, users may need to extract the .PHS records for a particular year, and then set a join, link, or relate to the extracted set.

The towns for which 1990/1991 land use is available are:

1 ABINGTON (EOTC)
2 ACTON (EOTC)
7 AMESBURY (EOTC)
9 ANDOVER (EOTC)
10 ARLINGTON (MWRA)
14 ASHLAND (EOTC)
16 ATTLEBORO (EOTC)
18 AVON (EOTC)
19 AYER (EOTC)
20 BARNSTABLE (CAPE)
23 BEDFORD (EOTC)
25 BELLINGHAM (EOTC)
26 BELMONT (MWRA)
83 EAST BRIDGEWATER (EOTC)
86 EASTHAM (CAPE)
88 EASTON (EOTC)
92 ESSEX (EOTC)
93 EVERETT (MWRA)
96 FALMOUTH (CAPE)
99 FOXBOROUGH (EOTC)
100 FRAMINGHAM (EOTC)
101 FRANKLIN (EOTC)
105 GEORGETOWN (EOTC)
107 GLOUCESTER (EOTC)
115 GROTON (EOTC)
116 GROVELAND (EOTC)
174 MAYNARD (EOTC)
175 MEDFIELD (EOTC)
176 MEDFORD (MWRA)
177 MEDWAY (EOTC)
178 MELROSE (EOTC)
179 MENDON (EOTC)
180 MERRIMAC (EOTC)
181 METHUEN (EOTC)
182 MIDDLEBOROUGH (EOTC)
184 MIDDLETON (EOTC)
185 MILFORD (EOTC)
187 MILLIS (EOTC)
188 MILLVILLE (EOTC)
258 SALEM (EOTC)
259 SALISBURY (EOTC)
261 SANDWICH (CAPE)
262 SAUGUS (EOTC)
264 SCITUATE (EOTC)
266 SHARON (EOTC)
269 SHERBORN (EOTC)
270 SHIRLEY (EOTC)
274 SOMERVILLE (MWRA)
277 SOUTHBOROUGH (EOTC)
284 STONEHAM (MWRA)
285 STOUGHTON (EOTC)
286 STOW (EOTC)

28 BERLIN (EOTC)
30 BEVERLY (EOTC)
31 BILLERICA (EOTC)
32 BLACKSTONE (EOTC)
34 BOLTON (EOTC)
35 BOSTON (MWRA)
36 BOURNE (CAPE)
37 BOXBOROUGH (EOTC)
38 BOXFORD (EOTC)
40 BRAINTREE (EOTC)
41 BREWSTER (CAPE)
42 BRIDGEWATER (EOTC)
44 BROCKTON (EOTC)
46 BROOKLINE (MWRA)
48 BURLINGTON (EOTC)
49 CAMBRIDGE (MWRA)
50 CANTON (EOTC)
51 CARLISLE (EOTC)
52 CARVER (EOTC)
55 CHATHAM (CAPE)
56 CHELMSFORD (EOTC)
57 CHELSEA (MWRA)
64 CLINTON (EOTC)
65 COHASSET (EOTC)
67 CONCORD (EOTC)
71 DANVERS (EOTC)
73 DEDHAM (EOTC)
75 DENNIS (CAPE)
78 DOVER (EOTC)
79 DRACUT (EOTC)
81 DUNSTABLE (EOTC)
82 DUXBURY (EOTC)
118 HALIFAX (EOTC)
119 HAMILTON (EOTC)
122 HANOVER (EOTC)
123 HANSON (EOTC)
125 HARVARD (EOTC)
126 HARWICH (CAPE)
128 HAVERHILL (EOTC)
131 HINGHAM (EOTC)
133 HOLBROOK (EOTC)
136 HOLLISTON (EOTC)
138 HOPEDALE (EOTC)
139 HOPKINTON (EOTC)
141 HUDSON (EOTC)
142 HULL (EOTC)
144 IPSWICH (EOTC)
145 KINGSTON (EOTC)
146 LAKEVILLE (EOTC)
147 LANCASTER (EOTC)
149 LAWRENCE (EOTC)
155 LEXINGTON (EOTC)
157 LINCOLN (EOTC)
158 LITTLETON (EOTC)
160 LOWELL (EOTC)
163 LYNN (EOTC)
164 LYNNFIELD (EOTC)
165 MALDEN (EOTC)
166 MANCHESTER (EOTC)
167 MANSFIELD (EOTC)
168 MARBLEHEAD (EOTC)
170 MARLBOROUGH (EOTC)
171 MARSHFIELD (EOTC)
172 MASHPEE (CAPE)
189 MILTON (EOTC)
196 NAHANT (EOTC)
198 NATICK (EOTC)
199 NEEDHAM (EOTC)
205 NEWBURY (EOTC)
206 NEWBURYPORT (EOTC)
207 NEWTON (EOTC)
208 NORFOLK (EOTC)
210 NORTH ANDOVER (EOTC)
211 NORTH ATTLEBOROUGH (EOTC)
213 NORTH READING (EOTC)
215 NORTHBOROUGH (EOTC)
216 NORTHBRIDGE (EOTC)
218 NORTON (EOTC)
219 NORWELL (EOTC)
220 NORWOOD (EOTC)
224 ORLEANS (CAPE)
229 PEABODY (EOTC)
231 PEMBROKE (EOTC)
232 PEPPERELL (EOTC)
238 PLAINVILLE (EOTC)
239 PLYMOUTH (EOTC)
240 PLYMPTON (EOTC)
242 PROVINCETOWN (CAPE)
243 QUINCY (EOTC)
244 RANDOLPH (EOTC)
245 RAYNHAM (EOTC)
246 READING (EOTC)
248 REVERE (EOTC)
251 ROCKLAND (EOTC)
252 ROCKPORT (EOTC)
254 ROWLEY (EOTC)
288 SUDBURY (EOTC)
291 SWAMPSCOTT (EOTC)
293 TAUNTON (EOTC)
295 TEWKSBURY (EOTC)
298 TOPSFIELD (EOTC)
300 TRURO (CAPE)
301 TYNGSBOROUGH (EOTC)
303 UPTON (EOTC)
304 UXBRIDGE (EOTC)
305 WAKEFIELD (MWRA)
307 WALPOLE (EOTC)
308 WALTHAM (MWRA)
314 WATERTOWN (EOTC)
315 WAYLAND (EOTC)
317 WELLESLEY (EOTC)
318 WELLFLEET (CAPE)
320 WENHAM (EOTC)
322 WEST BRIDGEWATER (EOTC)
324 WEST NEWBURY (EOTC)
328 WESTBOROUGH (EOTC)
330 WESTFORD (EOTC)
333 WESTON (EOTC)
335 WESTWOOD (EOTC)
336 WEYMOUTH (EOTC)
338 WHITMAN (EOTC)
342 WILMINGTON (EOTC)
344 WINCHESTER (MWRA)
346 WINTHROP (EOTC)
347 WOBURN (MWRA)
350 WRENTHAM (EOTC)
351 YARMOUTH (CAPE)

The following towns have been updated by UMass-Amherst using aerial photography flown during the years listed in parentheses:

ADAMS (1997)
ASHBURNHAM (1997)
ASHBY (1997)
ASHFIELD (1997)
ATHOL (1997)
BERNARDSTON (1997)
BUCKLAND (1995)
CHARLEMONT (1997)
COLRAIN (1997)
CONWAY (1997)
DEERFIELD (1997)
ERVING (1997)
FLORIDA (1997)
GARDNER (1997)
GILL (1997)
GOSHEN (1997)
GRANBY (1997)
GREENFIELD (1997)
HATFIELD (1997)
HADLEY (1997)
HAWLEY (1997)
HEATH (1997)
HUBBARDSTON (1992, 1997)
LEYDEN (1997)
MONROE (1997)
MONTAGUE (1997)
NEW SALEM (1992)
NORTHFIELD (1997)
NORTHAMPTON (1997)
NORTH ADAMS (1997)
ORANGE (1997)
PETERSHAM (1992)
PHILLIPSTON (1992, 1997)
PLAINFIELD (1997)
ROWE (1997)
ROYALSTON (1997)
SAVOY (1997)
SHELBURNE (1995, 1997)
SOUTHWICK (1997)
SUNDERLAND (1997)
TEMPLETON (1992, 1997)
WARWICK (1997)
WENDELL (1992, 1997)
WESTMINSTER (1992, 1997)
WINCHENDON (1997)

MAINTENANCE

MassGIS is maintaining this layer. Currently UMass-Amherst is developing land use data interpreted from 1999 1:25,000 color infrared photography. As MassGIS receives data from UMass they will go through a comprehensive quality-checking procedure and then be made available for general distribution. By late summer 2001 this 1999 land use should be available statewide. For the current availability please see the Land Use Status Map online at http://www.state.ma.us/mgis/st_lus.htm.

Surficial Geology Datalayer
October 1999

OVERVIEW

MassGIS has produced a statewide surficial geology datalayer showing the location of sand and gravel deposits. Originally the data were divided into three panels- west, east, and southeast that correspond to the USGS 1:250,000 map sheets that were used as a basemap. This datalayer is very generalized when compared to the other MassGIS data. MassGIS only uses the surficial geology data to produce volume or area measurements over a large region, e.g. a drainage basin. It is not accurate for site specific analysis.

As part of a major data development effort, the datalayer has been greatly enhanced. Now panelled by major basin groupings in Librarian, the data includes areas of fine-grained deposits and floodplains. For the original southeast panel, the 1:250,000 Providence, RI sheet, large sand deposits have also been delineated. Additionally, contour lines indicating depth of sand and gravel deposits have also been added. The coverages are called **SG** and are tiled by the WATRSHD2 library.

MANUSCRIPT

This datalayer was interpreted and compiled by Byron Stone, a USGS geologist. A set of USGS 1:250,000 film basemaps were enlarged onto stable based film at a scale of 1:125,000. The data were then recompiled from a set of 1:25,000 quadrangle sheets onto the 1:125,000 basemap. This manuscript does not precisely register with the standard MassGIS basemap.

METHODOLOGY

For the original datalayer production, the tics of the Transverse Mercator manuscripts were projected into the MassGIS State Plane coordinates before digitizing began. Polygons were labeled and a checkplot was made at manuscript scale.

The enhancement, also interpreted and compiled by Byron Stone, was completed in the fall of 1992. With the enlarged maps as basemaps, the fine-grained deposits, floodplains and contours were drafted onto film. MassGIS completed all digitizing from these overlays and subsequently, the linework was transformed and projected into state plane coordinates. As with the original manuscripts, these overlays do not precisely register with the MassGIS basemap. Plots were made at a scale of 1:125,000 and compared to the original manuscripts. The coverages were clipped to the 1:100,000 coastline.

In October 1999 this layer was moved from the BASIN library to WATRSHD2 when MassGIS received additional data from Pete Steeves of the USGS office in Northoborough, Mass., that completed the entire extent of all watersheds that cover Massachusetts. At the same time the layer was edited to remove old county lines that remained from a previous tiling scheme.

ATTRIBUTES

Each **SG.PAT** contains the following attributes:

CODE	1 - sand and gravel deposits 2 - till or bedrock 3 - sandy till over sand 4 - end moraines 5 - large sand deposits, where distinguished from sand and gravel deposits 6 - fine-grained deposits 7 - floodplain alluvium
AREA-ACRES	area in acres
RANGE	of depth of deposit, in feet, for code = 1 or 5

MAINTENANCE

MassGIS is managing this datalayer.

Soils Datalayer
December 2000

OVERVIEW

The soils datalayer has been automated from 1:25,000 published soils surveys as provided on various media by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). All soils data released by MassGIS have been "SSURGO-certified," which means they have been reviewed and approved by the NRCS and meet all standards and requirements for inclusion in the national release of county-level digital soils data. Soil survey areas are roughly based on county boundaries and the soils datalayer is stored in the QUAD2 library as 2 coverages per 7.5 minute USGS quadrangle. The **SOILS** layer (coverage **SOI**) contains the soil polygons; the **SOILSPOT** layer (coverage **SPO**) contains the special and ad hoc features.

This data set is not designed for use as a primary regulatory tool in permitting or siting decisions, but may be used as a reference source. Organizations, agencies, units of government or others may interpret this information, based on needs; however, they are responsible for the appropriate application. Federal, state, or local regulatory bodies are not to assign to the NRCS any authority for the decisions that they will make. The NRCS will not perform any evaluations of these maps for purposes related solely to state or local regulatory programs.

Maps that use NRCS SSURGO data must show the source (NRCS) and date and, space permitting, contain the following notation:

> **"This Soil Survey Geographic (SSURGO) data base was produced by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies for the Soil Survey of _____ County, (state). The soils were mapped at a scale of _____ with a _____ acre minimum size delineation. Enlargement of these maps to scales greater than that at which they were originally mapped can cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soil that could have been shown at a larger scale. The depicted soil boundaries and interpretations derived from them do not eliminate the need of onsite sampling, testing, and detailed study of specific sites for intensive uses. Thus, this map and its interpretations are intended for planning purposes only. Digital data files are periodically updated. Files are dated, and users are responsible for obtaining the latest version of the data."**

Specifics for each survey area can be found in the 'meta<survey_area>.txt' files that MassGIS distributes with all SSURGO data. The <survey_area> is an abbreviated county name, e.g. 'HHEA' for the Hampden-Hampshire East survey area (comprising the eastern portion of Hampden and Hampshire Counties.

PRODUCTION

Source materials vary by survey area and include scribecoat, clear film positives, and half-tone mylars containing soil lines as well as labels and cultural features. Source sheets to date contained data by "third-quad," a standard NRCS tiling scheme for its published surveys which splits a USGS quadrangle into three sections (north, central and south). Each survey done to date has been based on 1:25,000 orthophoto base maps. Source mylars were scanned at a resolution of 500 dots per inch. The scanned images were registered, rectified, and converted to grids using ARC/INFO. Soils linework was extracted from the grids in the ARC/INFO GRID module and vectorized. MassGIS completed all processing from scanning through vectorization. Map neatline development, line smoothing, labeling, edge matching, and merging of third-quads into full 7.5 minute quads was done by Massachusetts Department of Food and Agriculture staff. Special and ad hoc features such as rock outcrops or stripped land areas that are smaller than the original NRCS minimum mapping units were manually digitized by DFA. These features were captured due to their uniqueness in their surroundings and are represented as point and line data because they are too small to be shown as area features at the scale

of mapping. They form a coverage (SPO) separate from the soil area delineation. Mass DFA staff performed all quality checking prior to submittal for SSURGO certification. The NRCS Missouri Digitizing Unit reviewed the soil coverages and special and ad hoc features for adherence to Soil Survey Geographic (SSURGO) database standards. Once SSURGO certified by the Missouri Unit, MassGIS added annotation classes to the SOILS coverages. ANNO.CODE comprises the CODE item, ANNO.STATELEG the STATELEG item. In Arcplot use TEXTSET FONT to display the annotation.

ATTRIBUTES

Each **SOI.PAT** contains the following items:

CODE	The soil map unit that appears in the published soil survey. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils.
SS_AREA	Code for soil survey area
STATELEG	The corresponding code from the statewide legend. Published soil surveys vary in coding schemes and the statewide legend assigns one symbol to a soil map unit across the state.
SLOPE	Slope of the landscape, derived from the last character of the STATELEG item, if present Possible SLOPE codes are: A: 0-3% B: 3-8% C: 8-15% D: 15-25% E: 25-35% 0: Water or urban land (no slope)
SS_CODE	A unique value that contains both the CODE and the soil survey area item (SS_AREA) as a redefined item.

Each **SOI.AAT** contains the following items:

BOUNDARY	The boundaries of the soil survey area are coded as 'SS_SURV' and arcs representing USGS Quad tile boundaries are coded as 'QUAD.'
TYPE	Source of linework for lines added or edited after scanning during production. Possible TYPE codes are: SOIL: from scan DIGITI: digitized on screen or with tablet TOWNS: USGS town line used instead of NRCS polygon boundary

Each special / ad hoc feature **SPO** coverage contains a **.PAT** and **.AAT** with the following items:

LABEL	contains a three or four letter code representing the special or ad hoc feature description.
MAJOR	contains a numeric code representing a feature category based on USGS major code categories.
MINOR	contains USGS/NRCS codes that define nodes, areas, lines, and points.

Annotation was created for all soils polygons based on the 'LABEL' item in the .PAT.

RELATED DATABASE FILES

Map Unit Delineations are described by the Map Unit Interpretations Record data base. This attribute data base gives the proportionate extent of the component soils and the properties for each soil. The data base contains both estimated and measured data on the physical and chemical soil properties and soil interpretations for engineering, water management, recreation, agronomic, woodland, range, and wildlife uses of the soil. This database consists of the following relational tables developed by the NRCS:

SOI.COMP (map unit component) - stores information on soil map unit components
SOI.COMPYLD (component crop yield) - stores crop yield information for soil map unit components
SOI.FOREST # (forest understory) - stores information for plant cover as forest understory for soil map unit components
SOI.HELCLASS (highly erodible lands class) - stores the highly erodible land classification for wind and water assigned to the soil map units
SOI.HYDCOMP (hydric component information) - stores data related to the hydric classification, criteria, landform, etc.
SOI.INCLUSN (map unit inclusion) - stores the names of soils included in the soil map units
SOI.INTERP (interpretation) - stores soil interpretation ratings (both limitation ratings and suitability ratings) for soil map unit components
SOI.LAYER (soil layer) - stores characteristics of soil layers for soil map unit components
SOI.MAPUNIT (map unit) - stores information that applies to all components of a soil map unit
SOI.MUCOACRE (map unit county acres) - stores the number of acres for the map unit within a county
SOI.MUYLD (map unit yield) - stores crop yield information for the soil map unit
SOI.PLANTCOM # (plant composition) - stores plant symbols and percent of plant composition associated with components of a soil map unit

SOI.PLANTNM * (plant name) - stores the common and scientific names for plants used in the database. Relates to SOI.PLANTCOM on the 'PLANTSYM' item.
SOI.RANGENM * (range name) - stores the range site names (table not populated). Relates to SOI.RSPROD on 'RSID'.
SOI.RSPROD # (range site production) - stores range site production information for soil map unit components
SOI.SSACOAC * (soil survey area county acreage) - stores the acreage for the county within the boundary of the soil survey area. Relates to SOI.MAPUNIT by the 'STSSAID' item and to SOI.MUCOACRE on the 'CNTYCODE' item.
SOI.SSAREA * (soil survey area) - stores information that will apply to an entire soil survey area. Relates to SOI.MAPUNIT and SOI.SSACOAC on the 'STSSAID' item.
SOI.TAXCLASS * (taxonomic classification) - stores the taxonomic classification for soils in the data base. Relates to SOI.COMP on the 'CLASCODE' item.
SOI.WINDBRK # (windbreak) - stores information on recommended windbreak plants for soil map unit components
SOI.WLHABIT (wildlife habitat) - stores wildlife habitat information for soil map unit components
SOI.WOODLAND (woodland) - store information on common indicator trees for soil map unit components
SOI.WOODMGT (woodland management) - stores woodland management information for soil map unit components
SOI.YLDUNITS * (yield units) - stores crop names and the units used to measure yield. Relates to SOI.MUYLD on the 'CROPNAME' item.

These INFO tables relate to the coverage .PATs on the item 'STATELEG,' which uniquely identifies a soil map unit across the state. The INFO file **SOI.PRL** contains the relates for the 17 INFO files above containing the 'STATELEG' item. Table names with the '*' symbol above do not have direct links to the .PATs; these tables are related to other tables on other items as indicated in the specific descriptions above. MassGIS added the STATELEG item to each of these tables with the pre-existing item MUID (Mapunit Identification Symbol), which is a concatenation of the soil survey area id and the state legend code. The STATELEG item makes it possible to link to these relational tables regardless of survey area. The tables indicated with a'#' symbol above are part of the standard NRCS SSURGO release but deal with crops that don't occur in New England and thus are not populated.

One additional non-relational table provides further information:
SOI.CODES (data base codes) - stores information on all codes used in the data base

The following table provides descriptions of the codes used in the SPO coverages:
SOI.FEATURES (special feature codes) - stores information on all codes used in the 'LABEL' item in each special feature 'SPO' coverage.

SPO 'LABEL' codes include:

CLA - Clay spot
DRY - Dry spot
ESB - Escarpment, bedrock
ESO - Escarpment, other
GPI - Gravel pit
GRA - Gravelly spot
LDF - Landfill
LVS - Levee
LVXR - Levee without road
MAR - Marsh or swamp
MPI - Mine or quarry
ROC - Rock outcrop
SAN - Sandy spot
SLP - Short, steep slope
SPO - Spoil area
STN - Stony spot

STR - Stripped land
STV - Very stony spot
WET - Wet spot

Items in the **SOI.FEATURES** table:

FEAT_LABEL	Three-character code for special feature
FEAT_NAME	Name of special feature
FEAT_DESC	Full description of special feature

For lists and descriptions of the codes in all of the other tables, please refer to the section "Data base schema" and to Appendix A in the Soil Survey Geographic (SSURGO) Data Base users guide, available as a .pdf (portable document format) file (requiring Abobe Acrobat Reader) from MassGIS or on the world wide web at http://www.ftw.nrcs.usda.gov/ssur_data.html.

EDITING

Checkplots were made by DFA and reviewed by NRCS staff at various times during the editing process. NRCS soil scientists edgematched each survey area to all abutting surveys (including those in adjacent states) and these edits were incorporated into the quad coverages. Mylar checkplots were provided to NRCS for compilation of special and ad hoc features that were digitized by DFA staff. Each quad within the survey area was submitted to the NRCS Missouri Digitizing Unit for SSURGO review and these edits were incorporated in the final datalayer.

MAINTENANCE

This datalayer is maintained by DFA. Additional survey areas will be added as they become available. A current status map is at the MassGIS world wide web site at http://www.state.ma.us/mgis.

ADDITIONAL REFERENCES

Further information is available in the form of documents produced and maintained by the NRCS. These documents include:

The National Soil Survey Handbook, a multi-chapter guide that provides the main operational and procedural guidance for the soil survey program. All Handbook chapters are available for download in Microsoft Word 6.0 format on the web at http://www.statlab.iastate.edu/soils/nssh/. MassGIS will distribute a digital copy of this handbook (in Microsoft Word format) with the soils data.

The Soil Survey Manual, a single volume book which provides the major principles and practices needed for making and using soil surveys and for assembling and using data related to them. The Manual is intended primarily for use by soil scientists engaged in the classification and mapping of soils and in the interpretation of soil surveys. Although the Manual is oriented to the needs of those actively engaged in preparing soil surveys for publication, workers and students who have limited soils experience or are less familiar with the soil survey process also will be able to use the information. Visit http://www.nhq.nrcs.usda.gov/JDV/ssmnew/gen_cont.html to view the Manual on the web.

The Soil Survey Geographic (SSURGO) Data Base, often referred to as the "SSURGO Data Users Guide" or "data dictionary," provides data use information for users of SSURGO data. The Data Base contains detailed descriptions of the relational tables, including the definitions of soil data elements, definitions of the soil data codes, and a value table. Included are SSURGO attribute relational data base schema. The Data Base also discusses SSURGO map development, data collection, data structure, data voids, map hard copy production, user support, and distribution. This document is available for download as a .pdf (portable document format, viewable in Adobe Acrobat Reader) file on the web at http://www.ftw.nrcs.usda.gov/ssur_data.html. This file also is distributed with all SSURGO data from MassGIS.

MRIP Contiguous Natural Lands Datalayer
July 1999

OVERVIEW

The MRIP Contiguous Natural Lands datalayer was developed for the purpose of identifying large, contiguous tracts of natural land. "Contiguous" lands were defined using selected roads and a "natural land" definition tailored to meet the objectives of the MRIP (Massachusetts Resource Identification Project). The layer, **NATLANDS**, is stored in the **WATRSHD2** library, with each coverage named **NATL**. Also see the Riparian Corridors and Natural Riparian Corridors layers.

The identification of contiguous natural lands is listed as a priority for numerous conservation planning efforts. The Contiguous Natural Lands datalayer represents a coarse filter analysis of these features. Additional assessment may include: the geometry of these features (area-to-perimeter ratio, core area assessment, etc.), spatial juxtaposition, amount as well as location of "non-natural" landcover classes within and adjacent to natural lands, and spatial distribution of roads greater than class 5 (unimproved roads, trails) within the contiguous natural lands. Also note that the contiguous natural lands were delineated only within the Massachusetts state boundary and therefore may under-represent contiguous natural lands that cross state boundaries.

PRODUCTION

Road features from the Massachusetts Highway Department Roads datalayer with a CLASS less than or equal to 5 were combined with the Trains and Transmission lines datalayers, as well as with the state outline, to create boundaries for contiguous natural land polygons. Using ARC/INFO, "natural lands" features were selected from the MRLC National Landcover Datalayer with a reselect on the following landcover categories:

Landcover Code	Description
11	Open Water
31	Bare Rock/Sand
33	Transitional Bare
41	Deciduous Forest
42	Evergreen Forest
43	Mixed Forest
51	Deciduous Shrubland
81	Hay/Pasture
91	Forested Wetland
92	Emergent Herbaceous Wetland

The selected "natural lands" categories were coded as 1 within a NAT attribute item. The contiguous boundaries (roads, trains, transmission lines, state boundary) were unioned with the natural landcover features and then a reselect was applied to produce a datalayer containing contiguous natural lands greater than 250 acres. Because the MRLC National Landcover Datalayer originated as a grid with 30-meter cells, the polygon boundaries appear jagged at large scales. The coverage is best displayed at statewide or regional scales and should not be used for site analysis.

ATTRIBUTES

NAT	Contains values of 1 for all "natural lands"
CONTIGACRE	Area in acres for contiguous natural lands polygons, after being clipped for the WATRSHED library
ORIGACRES	Area in acres for the original contiguous natural land polygon greater than 250 acres, prior to being clipped

Selecting NAT = 1 will result in proper display and analysis of the data. Note that this datalayer was originally developed as a single statewide coverage. After being clipped into watershed-based tiles, some of the polygons originally delineated as contiguous natural lands (based on the process described above) were split into two or more polygons. The CONTIGACRE item represents the acreage of the polygon after being clipped. The ORIGACRES item is the acreage of the original, larger polygon that the newly clipped polygon "belonged to" prior to clipping.

MAINTENANCE

MassGIS is maintaining this datalayer.

MRIP Riparian Corridors Datalayer
July 1999

OVERVIEW

Riparian Corridors are defined as 100 meter corridors encompassing perennial stream and river features as coded within the MassGIS 1:25,000 hydro datalayer. This layer, **RIP-COR**, is stored in the **WATRSHD2** library with each tile's coverage named **RIPC**.

The identification of Riparian corridors has been highlighted as a priority in numerous conservation planning efforts, including the Massachusetts Resource Identification Project (MRIP). The MRIP riparian corridor datalayer represents one iteration, as well as a coarse filter analysis of these features. The 100 meter buffer distance is a subjective value derived from existing conservation plans, as well as current literature. Field verification is recommended as a "next step" in the planning process.

Overlaying the MassGIS hydro wetlands data is recommended for proper interpretation of this data. For example, a riparian corridor may appear to be severed within a landscape when in fact it is simply an area for which the corridor has ingress to a wetland and egress at another point along the wetland feature; wetlands were not included in the definition of riparian corridor. For proper display and analysis of the data select the item INSIDE = 100.

PRODUCTION

Riparian corridors enclose two types of spatial data features (arcs & polygons) and include portions of three general hydro datalayer codes: perennial streams, ponds, and rivers. A stream (a line feature) may flow across the landscape increasing in width to include ponds and rivers (polygon features) along it's route. A challenge in creating this datalayer was to include the polygons coded as ponds and rivers and yet omit isolated ponds that are not included in the definition of riparian corridors.

The selection process included:

- Lines with minor_num codes 412, 412007, 412009, 412020, 412609
- Polygons with minor_num codes 115, 116, 400 , 401, 412, 416, 115007, 115020, 115116, 115410, 115412, 115421, 115422, 115616, 412111, 412115, 619412, 421, 421007, 421619, 421625, 421628, 619421, 421625619, 421619625, 619625421, 101, 122, 101619, 101625, 421101, 619101, 101619625.

Polygon features (ponds) not part of the stream network were deleted through an assessment of tnode = fnode. Bays, estuaries, and mud flats were initially selected for program processing (assuring riparian buffer from rivers edge as opposed to mud flat) and then deleted. The stream network (perennial streams, rivers and selected ponds) was buffered 100 meters on each side of the line features and 100 meters from the edge of polygon features.

ATTRIBUTES

The .PAT (polygon Attribute Table) contains this item:

INSIDE Code value for riparian corridor (inside = 100 represent areas within the corridor)

MAINTENANCE

MassGIS is maintaining this datalayer. Related layers include MRIP Natural Riparian Corridors and MRIP Contiguous Natural Lands.

MRIP Natural Land Riparian Corridors Datalayer
July 1999

OVERVIEW

Natural Land Riparian Corridors are defined as "natural lands" within a 100 meter corridor encompassing perennial stream and river features (as coded in the MassGIS 1:25k Hydrography layer). This datalayer depicts areas within the riparian corridor that remain in a "natural state", potentially functioning as a corridor for select species movement, as well as additional ecological purposes. It is important to note the "natural land" definition and the distance defining the riparian corridor were tailored to meet the objectives of the Massachusetts Resource Identification Project (MRIP). The layer is named **NAT-COR** and is tiled in the **WATRSHD2** library, with coverages named **NATC**.

The identification of riparian corridors has been highlighted as a priority in numerous conservation planning efforts. Understanding whether the riparian corridor is functional is a logical next step. One approach for assessing the functionality of a riparian corridor is to assess whether it is in a natural condition. The MRIP Natural Lands Riparian Corridor datalayer represents one iteration, as well as a coarse filter analysis of these features. The 100 meter buffer distance is a subjective value derived from existing conservation plans, as well as current literature. The "natural lands" definition is tailored to meet specific project objectives. Field verification is recommended as a "next step" in the planning process.

Overlaying the MassGIS hydro wetlands data is recommended for proper interpretation of these data. For example, a natural land riparian corridor may appear to be severed within a landscape when in fact it is simply an area for which the corridor has ingress to a wetland and egress at another point along the wetland feature. Wetlands were not included in the definition of riparian corridor. In addition, an area within the 100 meter buffer distance may not display as a "natural land" landuse class when in fact it is recognized as a wetland within the Hydro data set. Attribute item INSIDE = 100 and NAT = 1 should be defined for proper display and analysis of the data.

PRODUCTION

Riparian corridors consist of two types of spatial data features (arcs & polygons) and include portions of three general hydro datalayer codes: perennial streams, ponds, and rivers. A stream (a line feature) may flow across the landscape increasing in width to include ponds and rivers (polygon features) along its route. A challenge in creating this datalayer was to include the polygons coded as ponds and rivers and yet omit isolated ponds that are not included in the definition of riparian corridors.

The selection process included:

- 25k Hydrography arcs with minor_num codes 412, 412007, 412009, 412020, 412609
- 25k Hydrography polygons with minor_num codes 115, 116, 400 , 401, 412, 416, 115007, 115020, 115116, 115410, 115412, 115421, 115422, 115616, 412111, 412115, 619412, 421, 421007, 421619, 421625, 421628, 619421, 421625619, 421619625, 619625421, 101, 122, 101619, 101625, 421101, 619101, 101619625

Polygon features (ponds) not part of the stream network were deleted through an assessment of tnode = fnode. Bays, estuaries, and mud flats were initially selected for program processing (assuring riparian buffer from a river's edge as opposed to a mud flat) and then deleted. The stream network (perennial streams, rivers and selected ponds) was buffered 100 meters from the line features and 100 meters from the polygon features. The result is a 100 meter buffer from the line features (perennial streams) and a 100 meter buffer from the edge (arcs) of the polygon features (rivers & selected ponds).

"Natural Land" categories of the MassGIS landuse datalayer (1985/1991, MacConnell) were defined as follows:

Landuse Code	Description
2	Pasture (extensive agriculuture)
3	Forest
4	Non-forested freshwater wetland
6	Abandoned agriculture, power lines, areas of no vegetation
14	Saltwater Wetland
20	Water
21	Woody perennial

These selected natural lands were intersected with the Riparian Corridor datalayer to produce the Natural Land Riparian Corridor datalayer.

ATTRIBUTES

NAT	Coded "1" for natural lands
INSIDE	Coded "100" for areas within the riparian corridor

MAINTENANCE

MassGIS is maintaining the datalayer. Related datalayers include MRIP Riparian Corridors and MRIP Contiguous Natural Lands.

U.S. EPA Ecoregions Datalayer
July 1999

OVERVIEW

The U.S. Environmental Protection Agency has construed, from geology, hydrology, climate, and the distribution of species, a set of 13 "ecoregions" in Massachusetts. Ecoregions denote areas within which ecosystems (the type, quality, and quantity of environmental resources) are generally similar; they are designed to serve as a spatial framework for environmental resource management. The layer was obtained for use in the Massachusetts Resource Identificaiton Project and is stored as a single statewide coverage, named ECO-REG. MassGIS modified the original EPA-produced layer by replacing its generalized coastline with the MassGIS 1:100,000 coast. The 13 regions (with ID numbers and names) are as follows:

Northeastern Highlands
581 - Taconic Mountains: An area of high hills and low mountains that contain the highest point in the state, Mt. Greylock. Streams are high gradient and lakes and ponds are rare. Vegetation is generally northern hardwoods with some spruce-fir at higher elevations.

582 - Western New England Marble Valleys/Berkshire Valley/Houstonic and Hoosic Valleys: This area is drained by the Hoosic and Housatonic Rivers. This area harbors farms, evergreen forests, transition and northern hardwood forests, and calcareous fens. The limestone in the area creates alkaline lakes and streams.

583 - Berkshire Highlands/Southern Green Mountains: The Deerfield, upper Westfield, Hoosic, and Housatonic Rivers drain this area. Lakes and ponds are relatively abundant. This area has deep soils that support northern hardwoods and spruce-fir forests.

584 - Lower Berkshire Hills: Similar to the Berkshire Highlands with its common northern hardwoods, but lacks spruce-fir and harbors transition hardwoods. Lakes and ponds are relatively abundant.

585 - Berkshire Transition: Forests are transition hardwoods and northern hardwoods. This area drains to the Westfield and Connecticut River basins.

586 - Vermont Piedmont: Forests are transition hardwoods and northern hardwoods. Hills are sometimes quite steep. Surface waters are highly alkaline. This area drains to the Deerfield and Connecticut River basins.

587 - Worcester Plateau: This area includes the most hilly areas of the central upland with a few high monadnocks and mountains. Forests are transition hardwoods and some northern hardwoods. Forested wetlands are common. Surface waters are acidic. Many major rivers drain this area.

Northeastern Coastal Zone
591 - Connecticut River Valley: The borders of this region are easily defined by the bedrock geology. It has rich soils, a mild climate and low rolling topography. The valley floor is primarily cropland and built land. Central hardwoods and transition hardwood forests cover the ridges.

592 - Lower Worcester Plateau: Comprises of open hills and transition hardwood and central hardwood forests. Most parts drain to the Chicopee and Quinebaug Rivers.

593 - Southern New England Coastal Plains and Hills: Comprises plains with a few low hills. Forests are mainly central hardwoods with some transition hardwoods and some elm-ash-red maple and red and white pine. Many major rivers drain this area.

594 - Boston Basin: Low hills and outlying hilly suburban towns mark this area's rim. The basin itself has low rolling topography and numerous urban reservoirs, lakes, and ponds. The flat areas were once tilled, but are now almost exclusively urban and suburban developments.

595 - Bristol Lowland/Narragansett Lowland: This region has flat gently rolling plains. Forests are mostly central hardwoods and some elm-ash-red maple and red and white pine. There are numerous wetlands, some cropland/pasture, and many cranberry bogs. Many rivers drain this area.

596 - Cape Cod and Islands: This region was formed by three advances and retreats of the Wisconsin Ice Sheet. The resulting terminal moraines. outwash plains, and coastal deposits characterize the area with their sandy beaches, grassy dunes, bays, marshes, and scrubby oak-pine forests. There are numerous kettle hole ponds, swamps, and bogs. Much of the surface water is highly acidic.

ATTRIBUTES

The **ECO-REG.PAT** (polygon attribute table) contains the following items:

ECOID	4	5	I	Ecoregion ID number (as listed above)
ECONAME	80	80	C	Ecoregion descriptive name (item added by MassGIS)
FUZZY	3	4	I	Transition areas for which the ecoregion characteristics match both adjacent ecoregions.

The **ECO-REG.AAT** (arc attribute table) contains the following item:

LINE	3	4	I	Line type: 0 - State Outline 111 - Specific Ecoregion 222 - Coarse Ecoregion 999 - Transitional "fuzzy" area

MAINTENANCE

MassGIS is maintaining the datalayer. Information on the original EPA layer may be found on the web at http://www.epa.gov/enviro/html/nsdi/projects/useco.html.

Hydrography (1:25,000) Datalayer
August 2000

OVERVIEW

MassGIS has edited and modified both the USGS 1:25,000 Hydrography Digital Line Graph (DLG) quadrangle files and the USGS 1:100,000 Hydrography DLG files and digitized hydrographic features from the USGS 1:25,000 Topographic Quadrangles to produce a hybrid 1:25,000 Massachusetts Hydrography Datalayer. The 1:100,000 DLG features were enhanced by digitizing those streams and ponds from the USGS quadrangles that were not part of the 1:100,000 data. More recently, MassGIS has also scanned USGS mylar separates to replace the 1:100,000 enhanced data with 1:25,000 features.

The 1:25,000 hydrography layer is stored in the QUAD library; each coverage is named **HD**. The paneling scheme may be found at the end of this document (*refer to Quadrangle Index map)*, however, the list of quadrangles and data sources are listed below.

PRODUCTION

The DLG quadrangles were converted into Arc/INFO coverages and projected into Massachusetts State Plane Coordinate System. The long list of items (MAJOR1, MINOR1, MAJOR2, MINOR2...) were then concatenated to a more simplified coding system. For each feature MINORn was truncated to three characters and linked to the other minor codes to create MINOR_TOT. For example, a submerged (612) wetland (111) is now coded MINOR_TOT = 612111. The original MAJORn, MINORn pairs are no longer part of the attribute tables.

The enhanced hydrography is a combination of two sources of data. The 1:100,000 DLGs were split into 1:25,000 quadrangles. The coverages were then enhanced by adding those streams and ponds that are on the 1:25,000 quadrangles, but missing from the 1:100,000 DLGs. Features, such as streams, that appear as polygons with two shores on the quadrangles, but appear as single lines on the 1:100,000 DLGs, were not changed. Linework that is more generalized on the 1:100,000 DLGs than on the quadrangles was not edited either. Only those features that were **missing** from the original 1:100,000 DLGs were added.

Quadrangles covering Nantucket and Martha's Vineyard were completely digitized from the 1:25,000 USGS quadrangles. Though not as thoroughly coded as the 1:25,000 DLGs, the linework is all at 1:25,000.

The scanned quadrangles were automated in-house by scanning USGS mylar separates at 500 dots per inch. The resulting images were vectorized in GRID and then edited in ARCEDIT. Features missing from the blue line separate (i.e. dams or man-made shore) were digitized from the paper quadrangles. Nearly all enhanced hydrography has now been replaced by the scanned and vectorized hydro.

EDITING

All of the enhanced, digitized and scanned quadrangles were checkplotted at 1:25,000. The 1:25,000 DLGs were randomly checkplotted. Each of the quadrangles was edgematched to its neighboring quads. The scanned hydrography was compared both to the source mylars and to the paper quadrangles to ensure completeness.

ATTRIBUTES

Each **HD<quad-id>** has both a .PAT and .AAT. The modified DLG coding scheme is extensive and includes a wide variety of features, including ponds, cranberry bogs, impoundments, wetlands, tidal flats, dams, streams, and aqueducts. Only the DLGs have been coded this completely. The other hydrography quadrangles have been coded to include ponds and streams and in the case of the scanned quads, wetlands.

Pond and Lake Identification System (PALIS) ids are unique codes which were added to ponds and

lakes by Department of Environmental Protection (DEP) GIS in conjunction with the DEP Division of Watershed Management (DWM) using identification codes developed by the DWM Pond and Lakes Information System. For historical reasons, some wetland polygons have PALIS ids. PALIS ids were also given to impoundment areas along rivers and when necessary closure lines were added.

The items in the .PAT are:

MINOR_TOT	15	15	C	concatenated feature code
SOURCE	3	3	C	data source ENH - 1:100,000 enhanced DLG - 1:25,000 USGS DLG DIG - 1:25,000 digitized quads SCN - 1:25,000 USGS mylar separate CNR - 1:24,000 Connecticut hydrography DEP - DEP modified feature MDC - MDC modified feature
PWSID	11	11	C	DEP public water supply identification number
CLASS	3	3	C	feature is within the watershed of a surface water supply
POLY_CODE	4	5	B	generalized code based on MINOR_TOT simplified to 9 codes: 0 = Land/Island 1 = Reservoir 2 = Wetland, Marsh, Swamp, Bog 3 = Flats, Shoals 4 = Dam, Weir 5 = River, Stream, Canal, Spillway 6 = Lake, Pond, Bay, Ocean, Impoundment 7 = Other Land Feature 8 = Other Water Feature
PALIS_ID	6	8	I	a unique ID from the Ponds and Lakes Information System
**** Redefined ****				
MINOR_NUM	15	15	I	same as MINOR_TOT, integer

The items in the .AAT are:

MINOR_TOT	12	12	C	concatenated feature code
SOURCE	3	3	C	data source ENH - 1:100,000 enhanced DLG - 1:25,000 USGS DLG DIG - 1:25,000 digitized quads SCN - 1:25,000 USGS mylar separate CNR - 1:24,000 Connecticut hydrography DEP - DEP modified feature MDC - MDC modified feature
PWSID	11	11	C	DEP public water supply identification number
CLASS	3	3	C	feature is within the watershed of a surface water supply
ARC_CODE	4	5	B	generalized code based on MINOR_TOT simplified to 11 codes: 0 = Unknown 1 = Shoreline 2 = Closure Line 3 = Apparent Wetland Limit 4 = Stream 5 = Intermittent Stream 6 = River Bank 7 = Other Water Feature 8 = Other Land Feature 9 = Intermittent/Indefinite Shoreline 98 = Assumed Transport Connection 99 = Transport Arc 999 = Quad Tile Neatline
****Redefined ****				
MINOR_NUM	12	12	I	same as MINOR_TOT, integer

Symbolizing on the POLY_CODE and ARC_CODE items may facilitate display.

MAINTENANCE

Continued development of this datalayer is underway. Though complete statewide coverage at 1:25,000 or 1:100,000 enhanced is now available, MassGIS is continuing to improve the quality of these data. Those areas that are now covered by enhanced hydrography are being replaced by vectorized 1:25,000 scanned USGS blue color separates.

The following table lists all the possible codes for a **POLYGON FEATURE** in the .PAT. These codes have been extracted and concatenated from the USGS DLG major/minor pairs. The digitized and enhanced hydrography quadrangles do not have the same level of coding.

MINOR_NUM	DESCRIPTION
101	RESERVOIR
102	COVERED RESERVOIR
105	INUNDATION AREA
106	FISH HATCHERY/FARM
107	INDUST WATER IMPOUND
109	SEWAGE DISP POND
111	MARSH/WETLAND
114	CRANBERRY BOG
115	FLATS
116	BAY/ESTUARY/GULF
122	MDC RESERVOIR
124	FILTRATION POND
300	SPRING
400	RAPIDS
401	FALLS
402	GRAVEL PIT W/WATER
404	PUMPING STATION
406	DAM/WEIR
408	SPILLWAY
410	ROCK
411	CREVASSE
412	STREAM
414	DITCH/CANAL
415	AQUEDUCT
416	FLUME
419	CHANNEL IN WATER
421	LAKE OR POND
422	CORAL REEF
999	LAND/ISLAND
7105	INUNDATION AREA
7111	MARSH/WETLAND
101619	RESERVOIR
101625	RESERVOIR
102111	COV RESERVOIR/MARSH

MINOR_NUM	DESCRIPTION
105007	iNUNDATION AREA
105111	INUN AREA/MARSH
109421	SEWAGE POND/POND
109611	SEWAGE POND-ABAND
109619	SEWAGE POND
111007	MARSH/WETLAND
111105	MARSH/INUN AREA
111114	MARSH/CRANBERRY BOG
111608	MARSH-SALT
111612	MARSH-SUBMERGED
114007	CRANBERRY BOG
114111	CRANBERRY BOG/MARSH
115007	FLATS
115020	FLATS
115116	FLATS/BAY
115410	FLATS/ROCK
115412	FLATS/STREAM
115421	FLATS/POND
115422	FLATS/CORAL REEF
115616	FLATS-NAVIGABLE
406618	DAM-EARTHEN
410115	ROCKS/FLATS
411007	CREVASSE
412111	STREAM/MARSH
412115	STREAM FLATS
412612	STREAM-SUNKEN
415604	AQUEDUCT-TUNNEL
419115	CHANNEL FLATS
419616	CHANNEL-NAVIGABLE
421007	LAKE OR POND
421101	POND/RESERVOIR
421111	POND WETLAND
421609	UNSURVEYED POND
421610	POND-INTERMITTENT

MINOR_NUM	DESCRIPTION
421612	POND-SUNKEN
421618	POND-EARTHEN
421619	LAKE OR POND
421625	LAKE OR POND
421628	LAKE OR POND
422115	CORAL REEF/FLATS
610402	INTERMIT PIT W/WATER
610421	INTERMITTENT POND
612111	SUBMERGED MARSH
619101	RESERVOIR
619412	STREAM
619421	LAKE OR POND
101111612	SUBMERGED RES MARSH
101619625	ESERVOIR
105007111	iNUN AREA/MARSH
105111007	INUN AREA/MARSH
111007105	MARSH/INUN AREA
111007612	MARSH-SUBMERGED
111007625	MARSH/WETLAND
111105007	MARSH/INUN AREA
111114007	MARSH/CRANBERRY BOG
111612007	MARSH-SUBMERGED
111612421	POND MARSH-SUBMERGED
111612619	MARSH-SUBMERGED
111612625	MARSH-SUBMERGED
114007111	CRANBERRY BOG/MARSH
114111007	CRANBERRY BOG/MARSH
421111007	POND MARSH
421619625	LAKE OR POND
421625619	LAKE OR POND
619625415	AQUEDUCT
619625421	LAKE OR POND
101111612625	RES MARSH-SUBMERGED

The following table lists all the possible codes for an **ARC FEATURE** in the .AAT. These codes have been extracted and concatenated from the USGS DLG major/minor pairs. The digitized and enhanced hydrography quadrangles do not have the same level of coding.

MINOR_NUM	DESCRIPTION
109	SEWAGE DISP/FILT BED
200	SHORELINE
201	MANMADE SHORELINE
202	CLOSURE LINE
203	INDEFINITE SHORELINE
204	APPARENT LIMIT
211	UPLAND TRANSPORT ARC
300	SPRING
401	FALLS
405	WATER INTAKE
406	DAM/WEIR
407	CANAL LOCK
408	SPILLWAY
409	GATE
412	STREAM
414	DITCH/CANAL
415	AQUEDUCT
416	FLUME
419	CHANNEL IN WATER
422	CORAL REEF
605	RIGHT BANK
606	LEFT BANK
999	UNKNOWN OR NEAT LINE
7204	APPARENT LIMIT
9606	LEFT BANK
200009	SHORELINE
200201	MANMADE SHORELINE

MINOR_NUM	DESCRIPTION
200606	LEFT BANK/SHORE
200610	INTERMITTENT SHORE
201002	MANMADE SHORELINE
201009	MANMADE SHORELINE
201020	MANMADE SHORELINE
201605	MANMADE RIGHT BANK
201606	MANMADE LEFT BANK
202412	CLOSURE LINE/STREAM
203625	INDEFINITE SHORE
203627	INDEFINITE SHORE
204007	APPARENT LIMIT
204009	APPARENT LIMIT
406009	DAM/WEIR
406017	DAM/WEIR
406618	DAM/WEIR-EARTHEN
412007	STREAM
412009	STREAM
412020	STREAM
412202	STREAM CLOSURE LINE
412601	STREAM-UNDERGROUND
412604	STREAM-TUNNEL
412609	STREAM-UNSURVEYED
412610	STREAM-INTERMITTENT
414009	DITCH/CANAL
414017	DITCH/CANAL
414610	CANAL-INTERMITTENT
414611	CANAL-ABANDONED
415412	AQUEDUCT/STREAM

MINOR_NUM	DESCRIPTION
415601	AQUEDUCT-UNDERGROUND
415604	AQUEDUCT-TUNNEL
415605	AQUEDUCT RIGHT BANK
415611	AQUEDUCT-ABANDONED
415612	AQUEDUCT-SUBMERGED
601412	UNDERGROUND STREAM
605009	RIGHT BANK
605201	RIGHT BANK-MANMADE
606009	LEFT BANK
606201	LEFT BANK-MANMADE
610200	INTERMITTENT SHORE
610412	INTERMITTENT STREAM
610414	INTERMITTENT CANAL
610421	INTERMITTENT POND
200618406	SHORE/EARTHEN DAM
201009020	MANMADE SHORE
201020002	MANMADE SHORE
201020605	MANMADE RIGHT BANK
201605020	MANMADE RIGHT BANK
201606009	MANMADE LEFT BANK
201606020	MANMADE LEFT BANK
202412617	CLOS LINE/STR UNDERP
406009017	DAM/WEIR
406618017	DAM-EARTHEN
406618200	DAM-EARTHEN/SHORE
412610009	STREAM-INTERMITTENT
412610202	INT STREAM CLOSURE
412610617	INT STRM UNDERPASS

Hydrography (1:100,000) Datalayer
August 2000

OVERVIEW

MassGIS has adapted and modified the USGS 1:100,000 Hydrography Digital Line Graph (DLG) quadrangle files to produce two core elements-

- ponds and lakes (approx. 3,500 polygons)
- streams and rivers (approx. 7,300 arcs)

Due to the size of the datalayers, ponds and streams were originally split into five panels: WEST, MID, EAST, SE, and ISLE. To avoid unnecessary splitting of features, these panels follow major drainage divides. The five panels were condensed to four panels (**WEST**, **MID**, **EAST** and **SE**) by combining ISLE with SE to simplify usage of this datalayer. In addition, ponds and streams are now in a single coverage for each panel. Upon moving the database to Librarian, the data was repaneled by major basin groupings *(refer to Basin Index map at the back of this document).* The coverage name is now **HD100_<num>** where <num> represents the tile unit of the basin index.

The coastline, the other major hydrography feature taken from the DLGs, was appended to the manually digitized community boundaries to create TOWNS, a MassGIS political boundary datalayer.

PRODUCTION

The DLG quad files were reformatted into Arc/INFO coverages and projected into the Mass. State Plane Coordinate system. The DLGs include extensive attributes that identify feature types (Minor Code 412 = Stream, 421 = Pond, etc.).

Wetlands were not extracted from the DLGs since more complete data is available from the 1:25,000 land use datalayer.

EDITING

After the features were sorted on attribute, the individual quad coverages were edgematched into five panels based on drainage basins (see index map). Proofplots were produced and compared to the paper 1:25,000 quads. The 1:100,000 hydrography DLGs were found to be significantly generalized in comparison with the 1:25,000 paper quads. Many small ponds and streams were not automated by USGS. Approximately 30% of the minor streams and 20% of the minor ponds are missing from the 1:100,000 DLGs.

Lines in the DLGs are less detailed than their 1:25,000 counterparts. These differences are not considered 'errors'.

Actual errors were noted and corrected. For example, braided streams and wetlands were sometimes incorrectly coded as ponds. Edges where two blocks of 32 quads met (a USGS defined unit of production) often did not match. In these cases, streams and ponds were digitized or moved as needed to complete the edgematching process.

MassGIS attributed most of the ponds with a PALIS-ID in the .PAT. The DFWELE GIS program attributed the named streams in the .AAT with a SARIS-ID with some additions to the PALIS-ID in the .PAT. Additional streams and ponds under study by the Division of Fisheries and Wildlife biologists which were not present in the 100k coverage were pulled from the 25k hydro data layer and attributed appropriately. In cases of a perched wetland, where the stream appeared to be connected to two river systems because the arc was continuous through the wetland, the DFWELE GIS program removed a tiny sliver of arc. In this way when the streams are plotted they would appear to flow out towards the major tributary. In the .PAT where the polygon is labeled a double-lined stream the SARIS-ID is being used as the PALIS-ID. This enables the stream to be shaded in

rather than just outlined.

ATTRIBUTES

The .PAT contains the following items:

NAME	the name of the feature
TYPE	character item- P = Pond, DS = Doubleline River, I = Island
FEATURE	numeric item- 1 = Pond, 2 = Doubleline River, 3 = Island
PALIS-ID	a unique ID from the Ponds & Lakes Information System (60% to 70% of ponds have a PALIS number)
BAS-ID	major basin code number- see MAJ-BAS datalayer description

The .AAT contains the following items:

SARIS-ID	a unique ID from the Streams & Rivers Information System
BAS-ID	the major basin id#
FEATURE	numeric item - 1 = Shore, 2 = River, 3= Doubleline River Shore

The ponds/lakes feature name and PALIS-ID were obtained from the UMass Water Resources Research Center. Additional ponds/lakes feature names and PALIS-IDs were obtained from the Division of Fisheries and Wildlife. The SARIS-ID was obtained from the Massachusetts Stream Classification Program, PART I: Inventory of Rivers and Streams (publication #14380-139-150-3-86-CR). A complete listing of stream names and their saris-ids can be found in the SARIS.LUT. A complete listing of pond/lake names and their PALIS-IDs can be found in the PALIS.LUT.

ANNOTATION

Names of ponds and streams have been added for cartographic display purposes. There are approximately 6,000 names, taken from the USGS 1:25,000 quads. The letters are 450 feet high (roughly 137 meters), which makes the annotation useful for output scales ranging from 1:50,000 to 1:100,000. The annotation is in two layers; layer one contains the stream names, and layer two contains the pond names.

MAINTENANCE

Maintained by MassGIS and the DFWELE GIS program.

Major Ponds and Major Streams Datalayers
July 1998

OVERVIEW

The Major Ponds and Major Streams datalayers represent a subset of hydrographic features from the 1:100,000 Basin-tiled HD100 layer. Large water bodies and rivers are included in these two layers, respectively, and are meant to be used for plotting small-scale maps. Both are stored as single statewide datasets: **MAJ_POND** and **MAJ_STRM**.

PRODUCTION

The data were taken from the more detailed 1:100,000 hydrography layer, which was developed from the US Geological Survey's National Marine Division 1:100,000 digital line graphs (DLGs). The determination of which features should be considered "major" was made by M. Frimpter, Chief Hydrologist for the USGS.

ATTRIBUTES

The MAJ_POND layer has a polygon attribute table (.PAT) with the following items:

ITEM NAME	WIDTH	OUTPUT	TYPE	
TYPE	2	2	C	Hydrographic feature type (character code): P = Pond DS = Double line river/stream I = Island
FEATURE	2	2	B	Hydrographic feature type (numeric code): 1 = Pond 2 = Double line river/stream 3 = Island
PRIMARY	1	1	I	Place-holder; codes have no meaning

The MAJ_STRM layer has an arc attribute table (.AAT) with the following item:

ITEM NAME	WIDTH	OUTPUT	TYPE	
PRIMARY	1	1	I	All arcs are streams coded "1"

MAINTENANCE

MassGIS is maintaining these layers.

Orthophoto Wetlands and Streams (1:5,000) Datalayers
June 2001

OVERVIEW

The Orthophoto Wetlands and Streams datalayers comprise a polygon coverage and a line coverage. They are registered to, and tiled by, the Orthophoto Quad Library. The attribute codes in the WETLANDS polygon coverage describe different types of wetland environments. The Wetlands polygon coverages are named **W** and compose the **WETLANDS** layer. The arcs in the line coverages, which are named **S**, represent streams and compose the **STREAMS** layer.

METHODOLOGY

The wetlands were interpreted from stereo, 1:12000 scale, color-infrared photography by staff at UMASS Amherst. The interpretation is field-checked by Department of Environmental Protection (DEP) Wetlands Conservancy Program (WCP). Completed interpretations are then scanned. The resulting images are converted to ARC/INFO coverages. The distortion from terrain and camera coordinates are removed using a photogrammetry software program, and a digital terrain model (DTM) derived from 1:5,000 black and white ortho-rectified digital aerial photography. The corrected coverages are then mapjoined and clipped by the boundary of a State Plane Coordinate grid cell which represents a 4-km. by 4-km. orthophoto sheet. Plots are generated at 1:5000 scale and final quality control is performed at that scale. It should be noted that the resulting wetlands are for planning purposes only; final wetland boundary determination must accord with MA Act M.G.L. c. 131.

ATTRIBUTES

Attributes for each W wetlands coverage is stored in an ARC/INFO **.PAT** (Polygon Attribute Table) with these items:

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
WETCODE	4	5	B	-	WETLAND CONSERVANCY CODES
ITEM_VALUE_C	12	12	C	-	WETLAND LABEL ABBREVIATIONS
ITEM_VALUE_DESC	60	60	C	-	DESCRIPTION OF WETLAND LABELS

The following types of wetlands are represented in the datalayer:

WETCODE	ITEM_VALUE_C	ITEM_VALUE_DESC
1	BA	COASTAL BANK BLUFF OR SEA CLIFF
2	BB	BARRIER BEACH SYSTEM
3	BE	COASTAL BEACH
4	BG	BOG
5	CB	CRANBERRY BOG
6	D	COASTAL DUNE
7	DM	DEEP MARSH
8	M	SHALLOW MARSH MEADOW OR FEN
9	OW	OPEN WATER
10	RS	ROCKY INTERTIDAL SHORE
11	SM	SALT MARSH
12	SS	SHRUB SWAMP
13	TF	TIDAL FLAT
14	WS1	WOODED SWAMP DECIDUOUS
15	WS2	WOODED SWAMP CONIFEROUS
16	WS3	WOODED SWAMP MIXED TREES
17	BB-BE	BARRIER BEACH-COASTAL BEACH
18	BB-BG	BARRIER BEACH-BOG
19	BB-D	BARRIER BEACH-COASTAL DUNE
20	BB-DM	BARRIER BEACH-DEEP MARSH
21	BB-M	BARRIER BEACH-MARSH
22	BB-OW	BARRIER BEACH-OPEN WATER
23	BB-SS	BARRIER BEACH-SHRUB SWAMP
24	BB-WS1	BARRIER BEACH-WOODED SWAMP DECIDUOUS
25	BB-WS2	BARRIER BEACH-WOODED SWAMP CONIFEROUS
26	BB-WS3	BARRIER BEACH-WOODED SWAMP MIXED TREES
88	N/A	N/A
99	U	UPLAND

An **.AAT** (Arc Attribute Table) exists in the Wetlands polygon coverage. Lines may be coded:

9999	represent the edge of a N/A, or not-interpreted area.
7777	represents a coastal area or approximate mean low water.
0	represents the edge of the orthophoto quadrangle area.

The stream coverages contain an .AAT without additional attributes. All arcs represent streams.

MAINTENANCE

These datalayers are being developed by DEP GIS group. Distribution is through MassGIS. Questions may be directed to DEP GIS to 617-574-6890.

The datalayers are currently under development. Data production is complete in the Wachusett, Ware, Quabbin, Shawsheen, North Coastal, Ipswich, Merrimack, Parker, Cape Cod and Islands basins. A large part of the Metro Boston area and Buzzards Bay basin are also complete. Production of additional wetlands data is underway in the southeastern part of the state. Please consult the current project status map at http://www.state.ma.us/mgis/st_wet.htm for the most up-to-date availability.

National Wetlands Inventory Datalayer
April 2000

OVERVIEW

The National Wetlands Inventory (NWI) project, administered by the U.S. Fish and Wildlife Service, was established to generate information about the characteristics, extent and status of the Nation's wetlands and deepwater habitats. Federal, State, and local agencies, academic institutions, the U.S. Congress, and the private sector use this information. The Emergency Wetland Resources Act of 1986 directs the Service to map the wetlands of the United States. The NWI has mapped 89% of the lower 48 states, and 31% of Alaska. The Act also requires the Service to produce a digital wetlands database for the United States. About 39% of the lower 48 states and 11% of Alaska are digitized. Approximately 50 percent of Massachusetts is available in digital format. For full details on the national mapping project visit the National Wetlands Inventory web site (http://www.nwi.fws.gov/).

The datalayer is named **NWI** and is stored in the **QUAD2** library. Each USGS quad-tiled coverage is named **NWI**.

PRODUCTION

MassGIS downloaded all individual 7.5-minute quad-tiled coverages site that cover Massachusetts from the NWI web. Processing included projection from Universal Transverse Mercator (UTM) to Mass. State Plane Mainland, NAD83 meters. Quality assurance was performed for attribute consistency and the data were placed into the QUAD2 library. Information on the original production of the data may be found in the NWI FGDC Metadata.

ATTRIBUTES

This layer contains polygon features representing various wetlands and deepwater habits and arcs representing rivers and streams. Each **NWI.PAT** (polygon attribute table) contains the following items:

ATTRIBUTE - Wetlands classification as interpreted by NWI
POLY_CODE - Generalized wetland class for plotting purposes, derived by MassGIS:
- 0 = Upland (non-wetland areas)
- 1 = Predominantly Open Water
- 2 = Estuarine, sub-tidal Marine Systems
- 3 = Estuarine, intertidal
- 4 = Non-tidal, aquatic bed
- 5 = Non-tidal, emergent vegetation
- 6 = Forested wetlands
- 7 = Non-tidal, scrub-shrub
- 8 = Non-tidal, unconsolidated shore
- 9 = Non-tidal, farmed land, bogs
- 10 = Tidal, channels

The POLY_CODE item was created to facilitate mapping and combines several values of the ATTRIBUTE field, as follows:

POLY_CODE	Contains 'ATTRIBUTE' values that begin with:
0	U
1	L1, L2, PUB, R2, R3, R5
2	E1, M
3	E2
4	PAB
5	PEM
6	PF, PR
7	PSS
8	PUS
9	Pf
10	R1

Complete definitions of the NWI 'ATTRIBUTE' codes are contained in the document nwi_def.doc (available for download at http://www.state.ma.us/mgis/nwi_def.doc in Microsoft Word 97 format). The text file http://www.state.ma.us/mgis/nwi_clas.txt contains a chart showing the

hierarchy of the NWI Wetlands and Deepwater Habitats Classification scheme.

Each **NWI.AAT** (arc attribute table) contains the following items:

ATTRIBUTE - Wetlands arc classification as interpreted by NWI
ARC_CODE - Generalized wetland class for plotting purposes, derived by MassGIS:
0 = Polygon boundaries
1 = Rivers and streams

MAINTENANCE

MassGIS provides these data for use with other data in Mass. State Plane projection and does not maintain or update the database. Data not currently in digital format will be added to our library when made available by NWI. For available data see http://www.state.ma.us/mgis/st_nwi.htm.

Public Water Supplies Datalayer
March 2001

OVERVIEW

The statewide Public Water Supply (PWS) datalayer (**PWS_DEP)** contains public community surface and groundwater supplies, as defined in 310 CMR 22.00, and 1528 public non-community sources.

The DEP PWS datalayer has been compiled from several sources. The original DEP PWS point dataset contained only community water supplies (CWS) which were located and digitized from stable mylar overlays based on USGS topographic quadrangles. In 1993 locations for approximately 2360 community and non-community sources were generated from global positioning system (GPS) data collected by the U.S. Environmental Protection Agency (EPA). The EPA GPS locations were merged with the existing DEP CWS point data to create the DEP PWS datalayer. From June 1996 to February 1997 the DEP GIS Program and Drinking Water Program (DWP) conducted an intensive update of the PWS datalayer. This update involved several sources including GPS field verification and resulted in the addition of 665 sources to the DEP PWS datalayer.

As stated in 310 CMR 22.00, a Community Water Supply is part of a community water system "which serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents." A Non-Community Water Supply is defined as a single service connection that is potentially available to 25 or more persons, such as a school, factory or restaurant. Non-Community Water Supplies are further defined as being Transient or Non-Transient based on the usage period, with less than 6 months use on a yearly basis being considered Transient.

DATA SOURCES

Public water supply source locations in the PWS datalayer have been compiled from a variety of data sources including field verification using GPS and traditional office based cartographic methods.

Field Verification:
The DEP PWS datalayer contains field-verified data developed from the following formats:

- GPS verified point data collected by EPA and DEP staff, differentially corrected (DGPS - optimal accuracy +/- 2-5 meters) and converted into Arc/INFO point features.
- Field-verified locations based on uncorrected GPS data.

Manuscript Maps:
PWS sources were either compiled by DEP technical staff on stable mylar overlays based on USGS (1:25,000) topographic quadrangle maps or directly onto one of the following GIS generated manuscript maps:

- MassGIS vector data-based map
- MassGIS USGS topographic image-based map
- MassGIS Black and White orthophoto image-based map

Coordinate Data:
Coordinate data provided by DEP DWP technical staff is projected to (NAD83) Massachusetts mainland state plane meters and used to generate PWS source locations.

METHODOLOGY

US EPA field-verified DGPS locations were provided in a digital format and converted into an Arc/INFO point coverage. Attributes from DWP water systems yearly reporting forms were then attached to the points. The original DEP CWS coverage was automated by DEP staff using traditional methods of tablet digitizing source locations on stable mylar overlays of USGS topographic quadrangles. Spatial and attribute data that existed in the CWS datalayer were then merged with the DGPS based PWS data to create the **PWS_DEP** datalayer.

Updated PWS point data were appended to **PWS_DEP** from a variety of sources including GPS mapping, manually and digitally compiled base maps, coordinate data and photo-interpretation. DEP staff used Trimble Navigation Ltd. Pathfinder Professional and GeoExplorer GPS receivers to field verify missing sources. Trimble GPS receiver parameters were configured to achive +/- 2- to 5-meter accuracy positions with differential correction.

DEP mapped DGPS positions were differentially corrected using base station data from EOEA's Pathfinder Community Base Station. DEP DGPS data were generated into Arc/INFO (NAD83 meter) point coverages and quality checked using MassGIS digital USGS topographic images and hand sketched locus maps provided by DEP field staff. Office checked data were compiled onto 1:25,000 GIS generated paper manuscripts, by DWP technical staff and digitized by GIS Program staff, using on screen technique. Coordinates (UTM and Lat/Long), verified and provided by DWP technical staff were projected to Massachusetts State Plane Coordinates (NAD 1983 meters), generated into ARC/INFO point coverages and merged with existing PWS point data. The DEP GIS Program also used .5 meter digital orthophoto images (1:5,000) to QC and refine community PWS wells, by locating the pumphouse on the orthophoto and adjusting the source location.

ATTRIBUTES

The DEP Water Quality Testing System (WQTS) database is the Department's central database for tracking water supply data. Data downloaded from WQTS is related to the PWS datalayer by the SOURCE-ID item and is used to populate attributes in the PWS datalayer.

The **PWS_DEP** datalayer has a point attribute table (.PAT) with the following items:

SOURCE-ID	DWP assigned PWS source identifier (first 7 digits conform to PWSID) The SOURCE-ID is used to relate PWS source locations to WQTS and other DWP maintained databases. The SOURCE-ID is generally unique, except for proposed wells (PW) which have not been officially approved and assigned an official SOURCE-ID. The SOURCE-ID for PW sources usually is the PWSID (see: redefined items below).
TOWN	Town in which the source is located
COUNTY	County in which the source is located
QUAD-NAME	USGS (7.5 minute – single) quadrangle name in which the source is located
BAS-ID	MassGIS ID indicating the major drainage basin in which the source is located
SITE-NAME	For community sources this is the source name (S_NAME) as listed in WQTS, for non-community Sources this is the public water supply name (PWS_NAME) as listed in WQTS. For proposed sources, which are not tracked in WQTS, this is the source name as submitted to the DEP GIS Program by DWP.
LATITUDE	Latitude in decimal degrees, Clarke1866 Spheroid, NAD27 (actual)
LONGITUDE	Longitude in decimal degrees, Clarke1866 Spheroid, NAD27 (actual)
TYPE	PWS Source Type: GW = groundwater PS = proposed surface water PW = proposed SW = surface water TNC = Transient Non-Community SD = source distribution NTNC = Non-Transient Non-community
SOURCECHK	Status of coverage data source quality check: GPS = Differentially corrected GPS data (2-5 meter accuracy) FC = Field verified by DEP technical staff, using uncorrected GPS data OC = Located using USGS (1:25,000) topographic quadrangle data or GIS generated vector data basemap PHO = Photo-interpreted from .5 or 1 meter resolution digital orthophoto images UNK = Source unknown
ZII-NUM	DEP DWP assigned ID number of Zone II associated with the source. Corresponds to the ZII-NUM item in the region subclass table (ZONE_II.PATZONE2) of the ZONE_II datalayer
GPM	Yield in gallons per minute (GPM): GPM = 0 indicates a pumping rate < 70 gpm GPM = 70 indicates a pumping rate of > 70 gpm (100,000 gpd)
WSPP	Water Supply Protection Plan (Y = yes)
QUADSID	MassGIS USGS quad ID in which the source is located
REG_OBJ_ID	DEP Facility Master File (FMF) Regulated Object ID – Unique Identifier
** redefined items**	
PWSID	DEP public water supplier or system iden. number (First 4 digits are DEP Region ID, followed by MassGIS Town ID)
REGION	DEP Region identification number: 1 = Western 2 = Central 3 = Northeast 4 = Southeast (corresponds to the first digit of PWSID and SOURCE-ID)
TOWN-ID	MassGIS Town identification number, corresponds to digits 2,3 and 4 of the PWSID and SOURCE-ID

The SOURCE-ID represents a well, well field, pumping station, or surface water withdrawal point source. In some instances the coverage will show a tightly grouped cluster of wells. Historically,

SOURCE-IDs were assigned to established water quality sampling locations. If a pumping station was the sampling point for a group of wells, it was assigned the SOURCE-ID, but if the individual well was sampled, the SOURCE-ID was given to each sampled well. A proposed source (PW) designates a test well or potential PWS that would require a new source approval to come on-line. Proposed sources have no assigned source identifier, but have a PWSID.

Be advised that at any time any of the PWS sources in this datalayer may be off-line for many reasons; no inference is made as to the condition of these sources. Please contact the appropriate water company for the latest status.

RELATED DATALAYERS

The DEP PWS datalayer is closely related to several important DEP water supply datasets.

DEP Approved Wellhead Protection Areas (Zone II)
PWS sources with assigned Zone IIs are related to the Zone II datalayer's Zone2 region subclass table by the item ZII-NUM (see: PWS_DEP.PRL). Please note that in most cases there are more than one PWS source per Zone II.

DEP Interim Wellhead Protection Areas (IWPA)
Although there is no database relate between the PWS sources and the IWPA datalayer, it is important to always display IWPAs with DEP PWS point data on any map or project. The IWPA data is a simple Arc/INFO polygon coverage generated from buffering the PWS source locations based on pumping rate or DEP default values.

DEP Surface Water Supply Protection Areas (Zone A, Zone B)
DEP Zone A and Zone B surface water supply protection areas are related to the PWS source data by SOURCE-ID.

RELATED DATABASE FILES

Several related INFO database files are provided to maintain linkages with other DWP data sets and to provide information for calculating Interim Wellhead Protection Areas (IWPA) and Zone 1 Protection Areas based on PWS source pumping rates. The attached INFO relate file **PWS_DEP.PRL** contains the relate environment for the PWS datalayer.

The file **PWS_DEP.WQTS** contains information downloaded from the DWP Water Quality Testing System (WQTS) Oracle database. WQTS is DEP's comprehensive repository for PWS information. The WQTS database contains many other data items that are not in the **PWS_DEP.WQTS** relate file. This table was designed for use by the DEP GIS Program to maintain the PWS datalayer in close relation to WQTS. Current items include:

PWSID	DEP water supplier identification number (see: PWSID description for PWS_DEP.PAT)
PWS_NAME	Water supplier name – conforms to SITE-NAME for non-community sources
PWS_CLASS	Source classification: COM = Community surface and groundwater sources NTNC = Non Transient Non Community NC = Transient Non Community
PWS_STATUS	Water supplier status (A = Active, I = Inactive)
SOURCE-ID	PWS source Identification number
S_NAME	Source name, conforms to SITE-NAME for community sources
S_STATUS	Source status (A = Active, I = Inactive)
S_AVAILABI	Source availability (ACTIVE, INACT, EMERG, ABAND), abandoned (ABAND) sources are NOT maintained in PWS_DEP

Only sources coded in WQTS as having Active (ACTIVE), Inactive (INACT) or Emergency (EMERG) availability (see: **S_AVAILABI** field) are maintained in **PWS_DEP**. Sources listed as abandoned (ABAND) in WQTS are removed from the PWS datalayer. Sources in WQTS that are coded as abandoned include both abandoned and decommissioned wells. Abandoned sources are no longer in use or are otherwise unfit for the purposes of water supply. Abandoned sources have been physically disconnected from the distribution system but have not undergone DEP's formal decommissioning process. Decommissioning requires physically rendering the source incapable of water supply.

The file **PWS_DEP.Z2DAT** contains information from the DEP DWP Zone II Tracking database.

Items include:

TOWN	Town in which the PWS source is located
WELLNAME	Source name
PURVEYOR	Water supplier name
BASIN	Major drainage basin in which the PWS source is located
REGION	DEP Region identification number: 1 = Western 2 = Central 3 = Northeast 4 = Southeast
SOURCE-ID DEP	PWS source ID (see: SOURCE-ID description for PWS_DEP.PAT)
ZII-NUM	Number of the Zone II (assigned by DEP DWP) delineated for the PWS source
METHOD	Method in which the Zone II was delineated
AQUIFER	Type of aquifer that comprises the Zone II
PROGRAM	DEP DWP program under which the Zone II was approved
SUB_DATE	Date the Zone II was submitted to DEP DWP for approval
APP_DATE	Date that the Zone II was approved
RATE_GPM	Source pumping rate in gallons per minute (GPM)
STATUS	Current Zone II status (C = Current, S = Superseded)
SYSTEM	PWS Classification (COMM – Community, NC – Non Community, N/A
WHP_CNTRL	Existing wellhead protection plan (Y = Yes, N = No)
BYLAW_DATE	Date of Bylaw approval containing well head protection plan

The file **PWS_DEP.SWP-BASINS** links PWS surface water supply (SW) sources to the MassGIS drainage sub-basins datalayer using the item SUB-ID. Items include:

SOURCE-ID	DEP PWS source ID (see: SOURCE-ID description for PWS_DEP)
REG_OBJ_ID	DEP Facility Master File (FMF) Regulated Object ID – Unique Identifier
SUB-ID	Drainage sub-basin identification number that contributes to the surface water supply
** redefined items **	
REGION	DEP Region identification number in which the surface water supply intake is located: 1 = Western, 2 = Central, 3 = Northeast, 4 = Southeast
TOWN-ID	MassGIS town identification number in which the surface water supply intake is located
BAS-ID	MassGIS major drainage basin identifier (see: Major Drainage Basins) in which the surface water supply intake is located
PWSID	DEP public water supplier or system ID number (First 4 digits are DEP Region ID, followed by MassGIS Town ID)

The file **PWS_DEP.DRS-BASINS** links direct river sources to the MassGIS drainage sub-basins datalayer using the item SUB-ID. Direct River Sources (DRS) are PWS surface water supplies with intakes located on Class B rivers. Items include:

SOURCE-ID	DEP PWS source ID (see: SOURCE-ID description for PWS_DEP)
SUB-ID	Drainage sub-basin identification number that contributes to the surface water supply
** redefined items **	
REGION	DEP Region identification number in which the surface water supply intake is located: 1 = Western 2 = Central 3 = Northeast 4 = Southeast
TOWN-ID	MassGIS town identification number in which the surface water supply intake is located
BAS-ID	MassGIS major drainage basin identifier (see: Major Drainage Basins data layer documentation) in which the surface water supply intake is located
PWSID	DEP public water supplier or system iden. number (First 4 digits are DEP Region ID, followed by MassGIS Town ID)

MAINTENANCE

The DEP GIS Program, in cooperation with DWP maintains this datalayer. Updates are made on a quarterly (Dec., Mar., June, and Sept.) basis, in accordance with the DWP's PWS new PWS source approval schedule. The updated datalayer is then shared through MassGIS.

Aquifers Datalayer
March 1997

OVERVIEW

MassGIS produced an aquifer datalayer composed of 20 individual panels, generally based on the boundaries of the major drainage basins. Areas of high and medium yield were mapped. These panels, which were retiled for Librarian, are called **AQ**. The layer is nameD **AQUIFERS**.

This datalayer includes polygon attribute coding to help in the identification of areas in which clean up of hazardous waste sites must meet drinking water standards, as defined in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000). A separate layer in the STATE library named **NPDWSACC** holds this data for Cape Cod (Non-Potential Drinking Water Source Areas for Cape Cod).

MANUSCRIPT

The USGS 1:48,000 hydrologic atlas series on groundwater favorability was produced for all of Massachusetts. The basemaps for these were photographically reduced and spliced together from 1:24,000 USGS quadrangles. Each manuscript covers one of the major drainage basins. They have been individually researched and published by the USGS-WRD starting in the 1960's and continuing to the present. Several have been compiled but not yet published. In these cases the draft manuscripts were automated.

The definition of high and medium yield varies between panels, as it does on the source manuscripts. While the medium yield for most basins is between 100 and 300 gpm (gallons per minute), this range may vary greatly from basin to basin. High yield definitions vary from basin to basin as well. Yield for each panel is found in the metadata file AQ.SRC.

Entering the data in Librarian format modified the tiling scheme of this layer. The aquifers are now tiled by major basin grouping as illustrated in the Basin Index map at the back of this document. However, the original tiling scheme may be recovered by reselecting on the PANEL item in the .PAT.

PRODUCTION

The high and medium yield categories were automated from the manuscripts. The major drainage basin boundary was copied from the MAJ_BAS coverage to use as a template for digitizing. Because ponds and lakes are also closely related to aquifers, they were clipped from the ponds datalayer and also used as a template. The USGS manuscripts were not edgematched to adjacent panels; no attempt has been made to resolve interpretation inconsistencies between panels.

ATTRIBUTES

Both a polygon attribute table (**.PAT**) and an arc attribute table (**.AAT**) were created for each aquifer panel. The AAT has one item called OUTLINE. The drainage basin boundary is coded as '1'. All other arcs are coded as '0'.

The **AQ<basin>.PAT** has the following ITEMS:

CODE	1=pond, 2=high yield, 3=medium yield
TYPE	character values the equivalent of the CODE item
YIELD	yield per minute for the aquifer classes
TRANSMISSIVITY	square feet per day
AREA-ACRES	area in acres of each polygon
NPDWSA	Non Potential Drinking Water Source Area
PANEL	original basin panel, used to identify source of aquifer data

For the purpose of identifying areas in which clean up of hazardous waste sites must meet drinking water standards, as defined in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), the DEP has coded polygons within the aquifer coverage to identify "Non Potential Drinking Water Source Areas" (NPDWSAs).

NPDWSAs include any Potentially Productive Aquifer or portion thereof which underlies land areas of at least 100 acres developed for one or more of the following uses as of January 1, 1996: Industry; Commerce; Dense residential development and associated uses; Transportation; or Urban open space; and those portions of Potentially Productive Aquifers that underlie US Census block groups with population densities of greater than 4,400 persons/square mile. Polygons where the item NPDWSA = 1 are designated as NPDWSAs. Polygons where the item NPDWSA = 0 are not designated as NPDWSAs.

As defined in the MCP, a Potentially Productive Aquifer means all aquifers delineated by the USGS as high or medium yield, and all aquifers located east of the Cape Cod Canal (Cape Cod), on the Elizabeth Islands, on Martha's Vineyard, or on Nantucket.

NPDWSA polygons within the aquifer coverage were delineated by the DEP based on land use information in the MassGIS land use coverage and population density data from the 1990 US Census. Municipalities were given the opportunity to review the DEP's delineation of NPDWSAs prior to the September 1996 promulgation of the current MCP groundwater clean up regulations. The delineation of NPDWSAs in the aquifer coverage may reflect additional land use information provided by municipalities.

For more detailed information about the designation of NPDWSAs and the MCP, please contact the DEP MCP Helpline @ (617) 338-2255 or 1-(800) 462-0444.

The item PANEL stores the panel code identifying data sources and changes of the data from its original tiling scheme. Using the identifier PANEL as the link between the data and metadata, table AQ.SRC contains the AQ<coverage>.DOC records from the original, individual aquifer coverages. More than one record may exist per panel.

EDITING

Plots of each panel were made at a scale of 1:48,000 and compared to the source map. Corrections were made as needed.

MAINTENANCE

DEP and MassGIS maintain this datalayer.

EPA Designated Sole Source Aquifers Datalayer
May 1996

OVERVIEW

The Sole Source Aquifer datalayer was compiled by the Department of Environmental Protection (DEP) Division of Water Supply (DWS). Seven Sole Source Aquifers have been designated by the US Environmental Protection Agency (EPA) for Massachusetts. The Sole Source Aquifers are stored as a statewide polygon coverage, **AQ_SOLE**. A Sole Source Aquifer (SSA) is an aquifer designated by US EPA as the 'sole or principal source' of drinking water for a given aquifer service area; that is, an aquifer which is needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should that aquifer become contaminated.

METHODOLOGY

The aquifers were defined by a EPA hydrogeologist. Aquifer boundaries were then drafted by EPA onto 1:25,000 USGS quadrangles. For the coastal sole source aquifers the shoreline as it appeared on the quadrangle was used as a boundary. Delineated boundaries were then digitized into Arc/INFO. However, to ensure that aquifer boundaries coincide with MassGIS coast data, the ARC RESELECT command was used to select the aquifer boundaries for Martha's Vineyard, Nantucket and Cape Cod SSAs. The coastal SSA boundaries are fluid and change with the change of shore line. Checkplots of the aquifers were submitted to US EPA Region 1 for verification.

ATTRIBUTES

This datalayer has a **.PAT** with the following attributes associated with each polygon:

SSA_NUM	a unique id for each SSA
SSA_NAM	the name of the SSA
SOURCE_CODE	the source of SSA linework

Several small waterbodies also are found within this coverage. These have been coded with a SSA_NAME of 'WATERBODY'.

MAINTENANCE

The DEP Division of Water Supply and MassGIS are maintaining this datalayer.

Major Drainage Basins Datalayer
March 1990

OVERVIEW

MassGIS has produced a statewide digital datalayer of the 28 major drainage basins of Massachusetts as defined by the USGS Water Resources Division and the MA Water Resources Commission. This single statewide datalayer is called **MAJ_BAS**.

MANUSCRIPT

A set of 1:24,000 USGS paper quad sheets was carefully delineated with approximately 1800 minor or sub- drainage basins. This work was produced over the past 20 years by the USGS-WRD. Generally, the contours on the quads are the primary guide to basin boundaries. Often the 'mouth' of a basin is marked at the site of a stream gauging station, which can be different from the strict geographic location of the mouth.

METHODOLOGY

The major basins were produced from the sub-basins using the Arc/INFO Dissolve command. This removed all lines except boundaries between major basins. This was possible because the Major Basin # is encrypted in the Sub-Basin-ID. The resulting Massachusetts internal major basin boundaries were then Appended to the state outline and shoreline, and processed to result in a statewide polygon datalayer, which is a digital facsimile of the Massachusetts Water Resources Commission official Massachusetts Drainage Basins Map. All sub-basins on the manuscripts were digitized (refer to SUB-BASINS Datalayer description). Due to good manuscript quality, including the visual edgematching of the 189 sheets, digitizing and edgematching was straightforward. The manuscript author was consulted on the minor errors and ambiguities that were discovered. Each panel was plotted at 1:48,000 and compared to the digitizing manuscript.

ATTRIBUTES

The **MAJ-BAS.PAT** (Polygon Attribute Table) contains 258 polygons because of the many coastal islands. Items in the .PAT include:

SQ. MILE	of each polygon
AREA-ACRES	of each polygon
BAS-ID	maj-bas numbers 1 to 28
NAME	each major basin has a name

KEY TO THE MAJOR BASIN NUMBERING SYSTEM

1	Hudson	15	Shawsheen
2	Housatonic	16	Parker
3	Deerfield	17	Ipswich
4	Westfield	18	North Coastal
5	Farmington	19	Boston Harbor
6	Connecticut	20	Charles
7	Millers	21	South Coastal
8	Chicopee	22	Cape Cod
9	Quinebaug	23	Islands
10	French	24	Buzzards Bay
11	Nashua	25	Taunton
12	Blackstone	26	Narragansett Bay & Mt. Hope Bay Shore
13	Merrimack	27	Ten Mile
14	Concord		

The Major Basin.AAT contains an item called OUTLINE. This enables the state border and shoreline to be differentiated from interior lines. This enables a different line type to be used for the outline of the state. Basin names exist in two different annolevels. Level 1 uses **Textset Carto**; Level 2 uses **Textset Plotter**.

MAINTENANCE

MassGIS is maintaining this datalayer.

Drainage Sub-basins Datalayer
March 2001

OVERVIEW

MassGIS has produced a statewide digital datalayer of the approximately 2300 sub-basins as defined and used by the USGS Water Resources Division and the Mass Water Resources Commission and as modified by Executive Office of Environmental Affairs (EOEA) agencies. These sub-basins were aggregated together to make the 28 basins of the Major Basins Datalayer. The **SUB_BASINS** layer is stored in the BASIN library; coverages are named **SUBBAS** (*refer to Basin Index map at the end of this document).* Cape Cod and the Islands do not have much lateral 'surface' drainage because the soils are so porous. The sub-basin line shown for Cape Cod is the approximate groundwater divide between Cape Cod Bay, Vineyard Sound, and the Atlantic Ocean, taken from sub-surface groundwater contours. The state coastline and boundaries are included in the sub-basin coverages and are differentiated by arc attributes.

MANUSCRIPT

A set of 1:24,000 USGS paper quad sheets was delineated into approximately 2200 minor or drainage sub-basins. This work was produced over the past 20 years mainly by the USGS-WRD. Generally, the contours on the quads are the primary guide to basin boundaries. Often the 'mouth' of a basin is marked at the site of a stream gaging station, which can be different from the strict geographic location of the mouth.

METHODOLOGY

All sub-basins on the manuscripts were digitized. Due to good manuscript quality, including the visual edgematching of the 189 sheets, digitizing and edgematching was straightforward. The manuscript author was consulted on the minor errors and ambiguities that were discovered.

Drainage boundaries added to Cape Cod were created by the Massachusetts Bays Program (the boundary separating drainage between Nantucket Sound / Cape Code Bay / Atlantic Ocean) and the Buzzards Bay Project (the boundary separating drainage between Buzzards Bay and Nantucket Sound / Cape Code Bay). The subdivisions were created by delineating groundwater divides using the 1:48,000 scale USGS Hydrologic Atlas Series maps. The delineations were reviewed for consistency by the USGS Water Resources Division, but they are not considered official basins of the USGS or the MA Water Resources Commission.

In the fall of 1992 the MA Department of Environmental Protection Division of Water Supply added the state boundary and 1:100,000 coastline and extended or clipped the sub-basins to meet them. Additional drainage basins were delineated at the intake points of public water supplies. From these additional basins all upstream basins were coded as contributing to a surface public water supply. DEP regional staff determined which water supplies were primary and which were emergency or backup supplies, and the MDC provided the basins covered by MDC/MWRA jurisdiction.

ATTRIBUTES

Each drainage sub-basin has a unique 5-digit SUB-ID number that was derived from the numbering system on the manuscripts. The numbers are roughly hierarchically ordered based on the sub-basin's position within the major basin. The ID-numbers ascend as the water descends. The first two numbers in the 5-digit code identify the 28 major basins as numbered in Massachusetts (see listing in the Major Basins Datalayer Description). This 2-digit code is duplicated in the (redefined) MAJ_BAS ITEM. The last three numbers in the **SUB-ID** are duplicated in the **(redefined) POSITION** ITEM. Offshore islands are given a **SUB-ID** of ##999 where ## is the nearest onshore **MAJ_BAS** ID.

The surface Water supply attribute, **WSP** is coded as follows:

WSP	BASIN DESIGNATION
0	Sub basin does not contribute to a Public Surface Water Supply
1	Public Surface Water Supply Watershed
2	Emergency/Backup Public Surface Water Supply Watershed
3	Adjacent State Surface Water Supply Watershed(incomplete)
4	MDC/MWRA Watershed
5	MDC/MWRA and Public Surface Water Supply Watershed

The arcs are coded with the two-digit attribute **LINE-ID**, which identifies the type of boundary the line represents:

LINE-ID	LINE TYPE
0	Sub-Basin Boundary
1	Major Basin Boundary
2	Coastline or State Boundary

EDITING

The entire datalayer was plotted at 1:100,000, selected areas at 1:25,000. Edgematching was done. The manuscript often had more than one ID per sub-basin. One was chosen by MassGIS. The water supply designation was plotted and checked by DEP regional staff.

MAINTENANCE

This datalayer is maintained by MassGIS.

Major Watersheds Datalayer
June 2000

OVERVIEW

MassGIS has produced a statewide digital datalayer of the 32 major watersheds covering Massachusetts as defined by the USGS Water Resources Division and the MA Water Resources Commission. The datalayer is called **WATRSHDS**. Unlike the MAJ_BAS layer, the watersheds in this layer extend beyond the state boundary to include the full extent of each watershed. This layer is used as the index coverage for the WATRSHED and WATRSHD2 libraries (see the *Major Watersheds Index Map* at the back of this catalog).

PRODUCTION

The WATRSHDS layer was originally based on the MAJ_BAS layer and then modified to fit the needs of the MassGIS Watershed Analyst project. The state boundary was removed from MAJ_BAS and the existing internal watershed boundaries were modified or adjusted to conform to the 1:25,000 Hydrography layer. To produce the watershed boundaries that extend beyond the state boundary, sub-basin data from the adjacent state GIS databases were incorporated. Some of these were adjusted to conform to the Networked Hydro Centerlines data, which was developed for use in the Watershed Analyst. These data are used for modeling stream flow. In some cases, the out-of-state sub-basins were clipped to include data that affect stream flow into or out of Massachusetts. In addition, the coastline was buffered for generalization. Non-contiguous basins, such as the two parts of the North Coastal watershed, were combined and connected with the coastal buffer to conform to the naming scheme as defined in the Stream and River Information System (SARIS).

ATTRIBUTES

The **WATRSHDS.PAT** (Polygon Attribute Table) contains the following items:

BAS-ID	Corresponding ID in MAJ_BAS layer
NAME	each major basin has a name
SARIS_NUM	Watershed ID according to SARIS
SQ_MI	Area in square miles of each polygon
AREA_ACRES	Area in acres of each polygon

The **WATRSHDS.AAT** (Arc Attribute Table) contains an item called OUTLINE. Internal watershed boundaries are coded Outline = 0; exterior lines are code Outline = 1.

Watershed names exist as annotation, subclass NAME.

MAINTENANCE

MassGIS is maintaining this datalayer.

Watershed Analyst Datalayers
July 1999

OVERVIEW

The WATRSHED library contains 32 tiles based on the SARIS (Streams and Rivers Information System) Ids of the major basins. Each tile name is a four-letter abbreviation of the basin name. The tiles are named as follows:

SARIS ID	Major Basin Name	Tile Name
11	Hoosic	HOOS
12	Kinderhook	KIND
13	Bashbish	BASH
21	Housatonic	HOUS
31	Farmington	FARM
32	Westfield	WEST
33	Deerfield	DEER
34	Connecticut	CONN
35	Millers	MILL
36	Chicopee	CHIC
41	Quinebaug	QUIN
42	French	FREN
51	Blackstone	BLAC
52	Ten Mile	TENM
53	Narragansett Bay	NARR
61	Mount Hope Bay	HOPE
62	Taunton	TAUN
71	Mystic	MYST
72	Charles	CHAR
73	Neponset	NEPO
74	Weymouth & Weir	WEYW
81	Nashua	NASH
82	Concord	CONC
83	Shawsheen	SHAW
84	Merrimack	MERR
91	Parker	PARK
92	Ipswich	IPSW
93	North Shore (N.Coastal)	NCOA
94	South Shore (S. Coastal)	SCOA
95	Buzzards Bay	BUZZ
96	Cape Cod	CAPE
97	Islands	ISLA

The WATRSHED library stores vector and raster data used in the MassGIS Watershed Analyst, an add-on suite of tools and menu choices in the MassGIS Data Viewer that allows for hydrological and watershed-based analysis within ArcView GIS. This page describes the data stored in the WATRSHED library for use with the Analyst.

PRODUCTION and ATTRIBUTES

Each tile contains:

cl_ : The centerline coverage. It contains arcs, routes, and SARIS routes. The centerline was created and routed using a set of ARC/INFO AMLs from the 1:25,000 Hydrography as featured on the USGS topographic quads.

Each **CL_.AAT** (arc attribute table) contains the following attributes:

TILE-NAME	name of SARIS major basin tile
MINOR_TOT	Type of water feature;Concatenated Digital Line Graph (DLG) codes
SOURCE	Data source for coverage (100K enhanced or 25K DLG)
PWSID	DEP PWS ID number of downstream Public Surface Drinking Water Supply
CLASS	Designated Use Classification (not yet implemented; Mass. Surface Water Quality Standards)
ARC_CODE	Generalized arc code derived from MINOR_TOT
HYA	Generalized arc code derived from MINOR_TOT
RMIN	Minor_num of polygon to right of arc
LMIN	Minor_num of polygon to left of arc
RHYP	Generalized arc code to right of arc
LHYP	Generalized arc code to left of arc
CONNECTED	Arcs that are in the route system
SARISNAME	Name of stream or river based on SARIS system
ARCLINK#	Links arc to its route in the section table
T-MEAS	Meters from mouth of routed major basin based on All route
SARISCODE	Stream code based on the SARIS (Stream and River Id System)
**** REDEFINED ITEMS ****	
MINOR_NUM	numeric version of MINOR_TOT

Each **CL_.RATRIVER** (river route attribute table) contains the following attributes:

LENGTH	Length of the route in meters
ORDER	Stream order (values 0-9 [no 1]) higher number = smaller tributary
URA	Id number of directly downstream rout
UMA	Measure in meters that route branches off downstream route
URB	Id number of directly downstream route
UMB	Measure in meters that route branches off downstream route
URC	Id number of directly downstream route
UMC	Measure in meters that route branches off downstream route
DRA	Id number of directly upstream route
DMA	Measure in meters that route comes off of upstream route
DRB	Id number of directly upstream route
DMB	Measure in meters that route comes off of upstream route
DRC	Id number of directly upstream route
DMC	Measure in meters that route comes off of upstream route
RIVER_NUM	Statewide unique id number for route
URAPX	Copy of URA in character format
URBPX	Copy of URB in character format
URCPX	Copy of URC in character format
DRAPX	Copy of DRA in character format
DRBPX	Copy of DRB in character format
DRCPX	Copy of DRC in character format

dbf directory: Under the dbf directory are 3 types of files:

- ***mth.dbf*** - this file is a point event table of the mouth points of the subbasins
- ***mXX00?us.dbf, mXX00?ds.dbf*** - for each mouth point of the major basin, there is a file for upstream and downstream. The XX is the SARIS id of the major basin. The ? is filled starting with 1 for the various mouth points of the major basins. For example, the Housatonic has 2 mouth points, so the files in this directory include m21001us.dbf, m21001ds.dbf, m21002us.dbf, m21002ds.dbf. These files are linear event tables and could be viewed by the user, but are for upstream / downstream trace processing purposes.
- ***sg.dbf*** - for each subbasin (subid), the square miles of each type of surficial geology is listed (sg1 = code 1, etc, as listed in the Surficial Geology datalayer description). This table allows for quickly accumulating the upstream surficial geology values without having to clip a large area, making for a faster delineation. These sg.dbf tables are used only when the user wants to get lowflow statistics (not when just doing a simple delineation).

odb directory: *XX00?us.odb, XX00?ds.odb* - for each mouth point of the major basin, there is a file for upstream and downstream. The XX is the SARIS id of the major basin. The ? is filled starting with 1 for the various mouth points of the major basins. For example, the Housatonic has 2 mouth points, so the files in this directory include 21001us.odb, 21001ds.odb, 21002us.odb, 21002ds.odb. These files are for delineation processing purposes and cannot be viewed by the user.

shps directory: This directory contains ESRI shapefiles for the basin. Shapefiles contain three component files: s*ubbas.shp*, *subbas.shx*, and *subbas.dbf*, referring to the subbasin boundaries for the tile. These subbasins were taken from the BASIN library (basin.sub_basins USGS subbasins), and modified slightly for technical reasons so that the watershed tools would complete delineations properly. Subbasins with no centerline were dissolved into adjacent subbasins, and some subbasin outlines were slightly modified so that the centerline was entirely contained within the subbasins. The small differences between the original subbasins coverage and the centerline coverage result from each dataset having been derived from different revisions of the USGS topographic maps.

grds directory: This directory contains 5 raster data files in ARC / INFO GRID format:

- ***clsg*** – A raster version of the cl_ centerline coverage. Cell size is 10m. Integer grid. Values are 1 (centerline cells) and NODATA.
- ***dir2*** – A flow-direction grid developed by Pete Steeves of the USGS Water Resources Division, Northborough, Mass. Flow-direction data provides the direction in which the water flows from a cell. This grid was created from altered USGS elevation grids using a special process to "burn in" the centerline, essentially altering the terrain to better represent the hydrographic features. Cell size is 10m. Integer grid. Values include:

  1 = East
  2 = Southeast

4 = South
8 = Southwest
16 = West
32 = Northwest
64 = North
128 = Northeast

- ***elev*** – Elevation grids, derived from 1:25,000 USGS DEM data. Cell size is 30 meters, represented in standard feet values.
- ***slope250*** – Contributed by Pete Steeves of the US Geological Survey, Northborough, Mass. Derived from 1:250K DEM data. Slope is in percent. Cell size is about 94 meters.
- ***strg*** – A flow-accumulation grid created from the dir2 grid by the ARC/INFO GRID command strg = flowaccumulation(dir2). Cell size is 10m. Floating point grid.

MAINTENANCE

These data datalayers are maintained by MassGIS. For information on data updates please contact Philip John by email at Philip.John@state.ma.us or by phone at (617) 626-1185.

For the latest data available for use in the Watershed Analyst, please see the current Status Map at http://www.state.ma.us/mgis/st_wa.htm.

When ordering a MassGIS Data Viewer that includes the above datalayers, choose the Data Viewer with Watershed Data option.

Abandoned Cranberry Bogs Datalayer
March 1997

OVERVIEW

The abandoned cranberry bogs datalayer was compiled by the Massachusetts Department of Environmental Protection (DEP) GIS Program from source material provided by the DEP Wetlands Conservancy Program (WCP). The data set **AB_CRAN**, is a buffered point coverage containing the location of 537 abandoned cranberry bogs in 41 Massachusetts municipalities in Barnstable, Bristol and Plymouth Counties.

BARNSTABLE COUNTY	BRISTOL COUNTY	PLYMOUTH COUNTY
BARNSTABLE	ACUSHNET	BRIDGEWATER
BOURNE	BERKLEY	CARVER
BREWSTER	EASTON	DUXBURY
CHATHAM	FAIRHAVEN	EAST BRIDGEWATER
DENNIS	FREETOWN	HALIFAX
EASTHAM	LAKEVILLE	HANOVER
FALMOUTH	TAUNTON	HANSON
HARWICH	RAYNHAM	HINGHAM
MASHPEE	ROCHESTER	KINGSTON
ORLEANS		MARION
SANDWICH		MARSHFIELD
TRURO		MATTAPOISETT
WELLFLEET		MIDDLEBOROUGH
YARMOUTH		PEMBROKE
		PLYMOUTH
		PLYMPTON
		WAREHAM

METHODOLOGY

Abandoned cranberry bogs were identified by the WCP from 1:12,000 color infrared (CIR) photography flown in April, 1993. A rough delineation of the boundary of each abandoned bog and an estimated center point was marked on a stable mylar overlay. The estimated center points of the abandoned cranberry bogs were then visually compiled onto paper (1:25,000 scale) GIS base maps and digitized. The area of each abandoned bog was estimated from the rough delineation on the mylar overlay, and the center points were buffered by the estimated area.

Abandoned bogs were identified through evidence of landscape features indicating previous cranberry growing activity, including surface hydrologic features and evidence of ditching or diking. Conducted by experienced wetlands delineators, this method provided accurate assessment of sites greater than 1/2 acre in size that had a high probability of being abandoned cranberry bogs. Comprehensive analysis and processing of the CIRs, combined with field survey work could be expected to identify more possible abandoned cranberry bogs.

ATTRIBUTES

The abandoned cranberry bog datalayer has a polygon attribute table (.PAT) containing the following items:

CBBOG-ID	Unique identifier consisting of flight line number, photo number and ab_unit number
F-LINE	CIR flight line number
PHOTO#	CIR photo number
AB_UNIT#	Unique integer code for each abandoned bog on a CIR
CLASS	Wetlands classification (available for Cape Cod only)
ACRES	Estimated area of abandoned cranberry bog in acres
SQ_FEET	Estimated area of abandoned cranberry bog in square feet (sq. ft.)
RADIUS2	Estimated area of abandoned cranberry bog in sq. ft. divided by pi (used to determine bog buffer radii)
CB-BUF	Bog center point buffer radius in feet
CB-BUF-METERS	Bog center point buffer radius in meters

MAINTENANCE

The DEP GIS Program maintains this datalayer.

DEP Eelgrass Datalayer
July 1999

OVERVIEW

Seagrass beds are critical wetlands components of shallow coastal ecosystems throughout the state. Seagrass beds provide food and cover for a great variety of commercially and recreationally important fauna and their prey. The leaf canopy of the seagrass bed calms the water, filters suspended matter and together with extensive roots and rhizomes, stabilizes sediment.

Eelgrass, *Zostera marina*, is the dominant seagrass present on the Massachusetts coastline. Another species, widgeon grass, *Ruppia maritima*, is present in areas of less salinity along the Cape Cod and Buzzards Bay coast. These seagrasses (and others not present in Mass.) are collectively categorized as submersed rooted vascular beds (SRV).

SRV are phototrophic plants requiring sunlight to conduct photosynthesis. The depth limit for SRV is a function of the penetration of light sufficient for net photosynthesis by these autotrophic rooted plants. In the more turbid waters of portions of Buzzards Bay and Cape Cod, this depth limit is less than 3 meters mean lower low water (MLLW). In the clearer waters of Nantucket Sound and the North Shore the depth limit is greater than 6 meters MLLW.

An accurate mapping inventory of the state's coastal SRV resources had not been previously conducted. The Mass. Department of Environmental Protection (DEP) Wetlands Conservancy Program (WCP) has developed and completed a project to map the SRV resources of the entire Massachusetts' coastline. This mapping effort was conducted with the financial and technical assistance of the National Oceanic and Atmospheric Agency (NOAA) Coastal Change Analysis Program (C-CAP) and the NOAA Coastal Services Center located in Charleston, SC. The project (conducted from 1994 through 1997) acquired aerial photography and conducted photointerpretation and extensive fieldwork to map the coastal SRV resource.

MassGIS distributes these data as two statewide layers: the **EELGRASS** polygon coverage, and the **EGRASVPT** point coverage.

METHODOLOGY

The mapping process involved the following steps:

Acquisition of Aerial Photography
Photointerpretation of SRV resources
Fieldwork to confirm Photo-interpreted features
Compilation to Digital Base Map
Independent Accuracy Assessment Procedure

1. Acquisition of Aerial Photography
Aerial photography (Aerocolor 2448 color positive film) at a scale of 1:20,000 was acquired over the period of 1993-1996.

Nantucket
Martha's Vineyard, Southern Cape Cod and Elizabeth Islands
Northern Cape Cod, South Shore, Boston Harbor and North Shore
Buzzards Bay and Mount Hope Bay

Photography was captured utilizing the following specifications:

80% endlap
30% sidelap

Low tide

Sun Angle of < 25 degrees from horizon

Wind < 10 mph
Minimal haze
Minimal turbidity

2. Photointerpretation

The accurate identification of SRV in aerial photographs requires visual evaluation of the fundamental elements of image interpretation (tone, color, contrast, texture and shadow). It also requires extensive experience at ground level in the particular study area. The photographic images of SRV and other benthic images vary in ways that cannot readily be modeled, described or communicated. Training for SRV photointerpretation includes: literature research, discussions with local ecologists and biologists, site visits, overflights in a small plane, and examinations of historical aerial photographs of the area.

SRV are observed best using stereo pairs of photographs and high quality stereoscopic instruments (DEP WCP uses a Cartographic Engineering Ltd. Model SB 190). SRV polygons are traced on overlays fixed to each photograph. Minimum mapping unit is 20 meters. SRV (and other benthic features) in a given area will present a variety of signatures depending upon the bottom sediment, depth, season and haze. Shadows from clouds or trees, turbid water, white caps, or sun glint may obscure SRV signatures in the photograph.

Fieldwork

Extensive fieldwork was required to verify that the photosignature was SRV or some other type of benthic feature (macroalgae, mussel bed, dark sand, shells, rock, or other). SRV can also be combined with any of these other benthic features. Fieldwork was conducted in a small boat using surface observation and underwater observation for which an underwater video camera system was utilized. Field notes were compiled on the overlay of the aerial photo to be used in the final photointerpretation process.

Compilation to Digital Base Map

The interpreted overlays were scanned using a photogrammeteric quality scanner (AGFA Horizon Plus) at a resolution of 600dpi resulting in a pixel resolution of .85 meters. The resulting image file was rectified (bi-linear 2nd order) to 1 meter color digital orthophotos supplied by Mass. Office of Coastal Zone Management. The polygon delineation from the rectified image was then digitized onscreen and coded for habitat type. In addition to the photo interpreted eelgrass polygon coverage (EELGRASS), a point coverage (EGRASVPT) was generated based on field-verified sites as well as all field-verified observations of widgeon grass (Ruppia maritima) and algae. The rectification and digitization was completed by the NOAA Coastal Services Center using the ERDAS Imagine software package.

Accuracy Assessment

The resulting polygon vector coverage was accuracy-assessed by NOAA
C-CAP in July 1997 and September 1998. The assessment was based on random points generated with the polygon boundaries. Navigation to each point in the field was accomplished using real time differential GPS (DGPS). The accuracy assessment of the digital SRV data revealed that 85.4% of the beds had been correctly mapped.

ATTRIBUTES

The attribute tables (.pat) for both the eelgrass polygon vector data and the field verified point data contain a single item called HABITAT, and the following codes:

Coverage	Field	Codes
EELGRASS	HABITAT	eelgrass, no eelgrass, rupia
EGRASVPT	HABITAT	algae, codium, eelgrass, no eelgrass, rupia

Code Definitions:

Code	Definition
Algae	Various forms of coastal macroalgae
Codium	Green algae with conspicuous large shape
eelgrass	Coastal submerged rooted vasucular plant – a seagrass
no eelgrass	Areas with NO observed eelgrass or algae
rupia	A vegetation found in shallow areas with varying salinities

LIMITATIONS

Extent of Inland Mapping Coverage

The project area for this data is the Massachusetts coastline. For coastal rivers which empty into the ocean, the up river extent of the polygon boundary was most often terminated at the first major highway bridge crossing.

Photointerpretation

Due to the limitations of the aerial photo interpretation process the extent of the SRV data presented with this mapping product should be considered conservative. The following factors contribute to this underestimation of SRV:

- the aerial photograph might have been captured when atmospheric and hydrospheric conditions were less than ideal ,
- the experience of the photointerpreter,
- nature of the subject area (dark underwater substrate), and
- the quality and amount of surface level field data.

MAINTENANCE

The Massachusetts DEP Wetlands Conservancy Program (WCP) maintains the eelgrass data. Updates are planned to be conducted on a 5-year cycle:

1999	Nantucket and Martha's Vineyard
2000	Cape Cod
2001	South Shore, Boston Harbor and North Shore
2000	Buzzards Bay, Elizabeth Is., Mt. Hope Bay

Please contact Charles T. Costello – (Section Chief) DEP WCP, (617) 292-5907, with any questions.

Areas of Critical Environmental Concern Datalayer
July 2000

OVERVIEW

The Areas of Critical Environmental Concern (ACEC) datalayer shows the location of areas that have been designated ACECs by the Secretary of Environmental Affairs. ACEC designation requires greater environmental review of certain kinds of proposed development under state agency jurisdiction (state permitting, planning, or funding) within the ACEC boundaries.

The ACEC Program is administered by the Department of Environmental Management (DEM) on behalf of the Secretary of Environmental Affairs. The Massachusetts Coastal Zone Management (MCZM) Office managed the original Coastal ACEC Program from 1978 to 1993, and continues to play a key role in monitoring coastal ACECs. Procedures for ACEC designation and the general policies governing the effects of designation are contained in the ACEC regulations (301 CMR 12.00). For more information about the ACEC datalayer or about the effects of ACEC designation, visit the ACEC Program's website at http://www.state.ma.us/dem/programs/acec or call (617) 727-3160 ext. 552.

The ACEC datalayer has been compiled by MCZM and DEM and includes both coastal and inland areas. New ACEC polygons are added periodically (1/year on average) because the program continues to evaluate and designate new ACECs. Currently the datalayer contains 25 ACECs.

MANUSCRIPT

Polygons are compiled from 1:25,000 USGS quad sheets, 1:5000 orthophotos, or other MassGIS datalayers and digitized.

ATTRIBUTES

This data layer has a .PAT with the following items:

ACECID	Unique identifier of each area
NAME	Name of the ACEC
DES-DATE	Date the ACEC was designated by the Secretary of Environmental Affairs
SECRETARY	The name of the Secretary who signed the designation
AREA-ACRES	Acreage of each polygon in the ACEC (many ACECs have more than one polygon)
ADMIN_BY	Agency responsible for the ACEC
REGION	Coastal or Inland. DEP Wetlands Protection Act Regulations have different performance standards for coastal and inland ACECs

EDITING

Boundaries were snapped to roads, drainage basins, trails, etc. depending on the item defining the edge. Where the snapcover is at a lower resolution than the USGS quad (roads, streams, etc.), data were changed to provide "relative visual accuracy."

MAINTENANCE

DEM continues to add polygons as new ACECs are designated. The most recent was the Miscoe, Warren and Whitehall Waters ACEC in July 2000.

Protected and Recreational Open Space Datalayer
December 2000

OVERVIEW

The protected and recreational open space datalayer contains the boundaries of conservation lands *and* outdoor recreational facilities in Massachusetts. The associated database contains relevant information about each parcel, including ownership, level of protection, public accessibility, assessor's map and lot numbers, and related legal interests held on the land, including conservation restrictions. Conservation and outdoor recreation facilities owned by federal, state, county, municipal, and nonprofit enterprises are included in this datalayer. Privately owned recreation lands and lands with deeded restrictions are also included, as are lands in the Chapter 61 program. The open space sites are set up to link to the 1988 Statewide Comprehensive Outdoor Recreation Plan (SCORP) inventory, which contains facilities and activities data for recreation sites. The SCORP data entry process is currently incomplete.

The datalayer is paneled into 351 town coverages and updates are ongoing. This update effort, coordinated by MassGIS, relies on volunteers from state environmental agencies, regional planning commissions, local watershed associations, town conservation commissions, municipal planning and engineering departments, local and regional nonprofits, and open space planning committees.

Although the initial data collection effort for this data layer has been completed, open space changes continually and this data layer is therefore considered to be under development. Additionally, due to the collaborative nature of this data collection effort, the accuracy and completeness of open space data varies across the state's municipalities. Attributes, while comprehensive in scope, may be incomplete for many parcels.

An evaluation of the accuracy and completeness of open space data for each municipality can be found in the database file OSPST.DBF or in the INFO file OS_STATU (for export files) distributed with open space data. For more information or to obtain the current status of a municipality, please call (617) 626-1076.

The following types of land are included in this datalayer:

conservation land	habitat protection with minimal recreation, such as walking trails
recreation land	outdoor facilities such as town parks, commons, playing fields, school fields, golf courses, bike paths, scout camps, and fish and game clubs. These may be privately or publicly owned facilities.
town forests	
parkways	green buffers along roads, if they are a recognized conservation resource
agricultural land	land protected under an Agricultural Preservation Restriction (APR) and administered by the state Department of Food and Agriculture (DFA)
aquifer protection land	not zoning overlay districts
watershed protection land	not zoning overlay districts
cemeteries	if they are a recognized conservation or recreation resource

Also included for some towns are lands in the Chapter 61 program (61 = Forestry; 61A = Agriculture; 61B = Recreation). These parcel boundaries are not currently available statewide, and may *not* be maintained over time, but can be useful for municipal planning purposes.

ORIGINAL SOURCE MANUSCRIPTS and ORIGINAL PRODUCTION

State and federal lands were originally compiled in 1988 from 1:25,000 scale maps by the Department of Regional Planning and Landscape Architecture at the University of Massachusetts at Amherst. The data were verified and are maintained by each agency of the Executive Office of Environmental Affairs (EOEA). Each agency maintains its own maps according to its own standard operating procedures and the accuracy of these maps varies. Some parcels were drafted onto USGS quadrangles from detailed surveys, while in other cases the exact property boundary is not known. The compilation process that produced a unified manuscript faithfully reproduced the

property boundaries as represented on the agencies' maps. The DFWELE cartographer then compiled onto this manuscript the land holdings of the National Park Service (NPS), US Fish & Wildlife Service (USFWS), and The Trustees of Reservations (TTOR, incomplete). Updating of this coverage began in the fall of 1989 and is ongoing.

Also included in the original open space datalayer were some community and local lands within Berkshire and Essex Counties and the Nashua River Basin. The production methodology varied subtly by region. Compilation of open space holdings in Essex County had already been done by the Essex County Greenbelt Association (ECGA), and these 1:25,000 scale maps were used as the manuscript for Essex County. Manuscripts for Berkshire County were compiled by the Berkshire County Cooperative Extension Service in cooperation with town assessors, conservation commissions, and local land trusts. Manuscripts for the Nashua River Basin were prepared jointly by DFWELE and the Department of Food and Agriculture (DFA) from town assessors maps.

CURRENT SOURCE MANUSCRIPTS and PRODUCTION METHODOLOGY

The open space datalayer is divided into 351 town panels and is held in the MassGIS TOWN library. Existing information (both geographic and attribute) continues to be updated with the assistance of volunteers at the local level and with the assistance of local land trusts and regional planning commissions. The resulting data are variable in their accuracy and completeness. Geographic data sources are predominantly town tax assessor's maps and existing open space plans. We maintain a record of all source maps used. Often these maps have been recompiled by the volunteers onto a standard 1:25,000 basemap produced by MassGIS. The data are then digitized or scanned from these basemaps. In other cases data may be digitized from a map supplied by our volunteer if this map meets minimum digitizing requirements. Increasingly, data are also pulled into the open space coverage from preexisting digital data layers provided by a municipality, regional planning agency, or state agency. All polygons bordering a road, stream, pond, town boundary, or coastline are coded according to the coincident feature. The production methodology used with each town coverage and an evaluation of the quality of source materials can be found in the ospst.dbf file or the OS_STATU info file included in the data export.

NOTE ON APPROPRIATE USE OF DATA:
These data are very useful for most statewide and regional planning purposes. However, they are <u>not</u> a legal record of ownership, and the user should understand that parcel representations are generally not based on property surveys.

ONGOING DATA ENHANCEMENTS

SCORP attributes are being updated with data provided by volunteers; additional information will be available for many recreation sites, including available facilities and suitable activities. All sites purchased with funds administered by the Division of Conservation Resources (DCS), EOEA are being added to the data layer, including sites in the Self-Help and Urban Self-Help programs. All Conservation Restrictions approved by the Secretary of EOEA will be added to the data layer. MassGIS is also attempting to map Chapter 61 lands in all municipalities.

Regions exist in a subclass called REGSITE. These regions are classified by site name so that multiple adjacent parcels with identical property names are grouped together as a site. This is useful for linking annotation and SCORP information to sites. The region attribute table (.patregsite) contains a subset of the fields in the polygon attribute table including SITE_NAME, SCORP_ID, FEE_OWNER, SYMOP1 and a field called REGION-ID used for linking to annotation. Annotation has been added to display property names and owners in two subclasses anno.site and anno.owner. Site name annotation exists in four levels so that annotation can be displayed at a variety of scales. The text attribute table (.tat) contains the item REGION-ID to link annotation to regions (sites). This anno will be edited as towns get updated.

DATAFILE NAME: OSP.PAT
53 ITEMS: STARTING IN POSITION 1

COLITEM	NAME	WDTH	OPUT	TYP	N.DEC	
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	OS#	4	5	B	0	
13	OS-ID	4	5	B	0	
17	TOWN-ID	3	3	I	-	
20	POLY-ID	4	4	I	-	
24	COUNTY_CODE	2	2	I	-	
26	SCORP_ID	6	6	I	-	
32	FEE_OWNER	20	20	C	-	
52	STATUS_FEE_OWNER	1	1	C	-	
53	MANAGER	20	20	C	-	
73	STATUS_MANAGER	1	1	C	-	
74	OTHER_1	20	20	C	-	Enterprise(s) holding a
94	INT_1	4	4	C	-	legal interest, other than
98	STATUS_1	1	1	C	-	owner, in this land. **
99	OTHER_2	20	20	C	-	
119	INT_2	4	4	C	-	
123	STATUS_2	1	1	C	-	
124	OTHER_3	20	20	C	-	
144	INT_3	4	4	C	-	
148	STATUS_3	1	1	C	-	
149	GRANTPROG1	10	10	C	-	
159	GRANTSTAT1	1	1	C	-	
160	GRANTPROG2	10	10	C	-	
170	GRANTSTAT2	1	1	C	-	
171	SITE_NAME	30	30	C	-	
201	AREA_ACRES	9	9	N	2	
210	ASSESS_ACRES	9	9	N	2	
219	DEED_ACRES	9	9	N	2	
228	PROJ_ID1	10	10	C	-	For EOEA legal interests only.
238	PROJ_ID2	10	10	C	-	For EOEA legal interests only.
248	PROJ_ID3	10	10	C	-	For EOEA legal interests only.
258	FY_FUNDING	4	4	I	-	
262	CAL_YR_REC	4	4	I	-	
266	BOND_ACCT	10	10	C	-	For EOEA legal interests only
276	PRIMARY_PURP	1	1	C	-	Primary purpose
277	PUB_ACCESS	1	1	C	-	Public access
278	LEV_PROT	1	1	C	-	Level of protection
279	CH61_PROG	1	1	C	-	
280	EOEAINVOLV	1	1	I	-	
280	OS_DEED_BOOK	6	6	I	-	
286	OS_DEED_PAGE	4	4	I	-	
290	ASSESS_MAP	5	5	C	-	
295	ASSESS_BLK	5	5	C	-	
300	ASSESS_LOT	5	5	C	-	
305	ASSESS_SUBLOT	5	5	C	-	
310	BASE_MAP	6	6	C	-	MassGIS base map number.
316	SOURCE_MAP	6	6	C	-	Volunteer's map.
322	COMMENTS	60	60	C	-	
382	DFWFLAG	2	2	C	-	
384	POLY-DATE	8	8	D	-	Date polygon was digitized.
392	ATT-DATE	8	8	D	-	Date attributes were entered.
400	SYMOP1	16	16	C	-	(Used for plotting maps with symbol LUT)
416	CR/APR	4	4	c	-	(Used for plotting maps with symbol LUT)
	** REDEFINED ITEMS **					
17	OS_ID	7	7	I	-	Unique GIS identifier
382	FLAG1	1	1	C	-	
383	FLAG2	1	1	C	-	
20	Z1	1	1	C	-	
20	Z2	2	2	C	-	
20	Z3	3	3	C	-	
17	TILE-NAME	3	3	C	-	
228	PROJECTIDS	30	30	c	-	

** The fields OTHER_<#>, INT_<#>, and STATUS_<#> together describe an enterprise holding a legal interest, other than fee_owner, on the land.

See next page for codes used.

MAINTENANCE

MassGIS is maintaining this datalayer. Any updates or corrections sent to MassGIS will be verified and incorporated into the datalayer. Please refer to the OS_ID when informing us of incorrect data. Anyone wishing to volunteer to gather information for their town for inclusion in this datalayer should also contact MassGIS at (617) 626-1076.

CODE DESCRIPTIONS FOR OPEN SPACE

(Within each section all codes are applicable to all fields)

1. STATUS FIELDS

Field:	Code:	Description:
STATUS_OWNER (SFO)	F	Federal
STATUS_MANAGER	S	State
STATUS_1	C	County
STATUS_2	M	Municipal
STATUS_3	N	Private Nonprofit (e.g.TTOR, MAS, local land trusts)
	P	Private for profit (individuals, country clubs, privately owned campsites, rod & gun clubs, etc.)
	B	Public Nonprofit (offshoots of public entities usually created because most public entities are not eligable for many grant programs so they set up 'foundations' or 'centers' to qualify for grants.)
	O	None of the above (e.g., joint ownership)
	X	Unknown
	I	Inholding (a piece of unprotected property surrounded on all sides by a protected property or a recreational facility)
	W	Water body (entire polygon is water)
		Unconfirmed:
	1	State or state (alternate state agencies)
	2	State or non-profit
	3	State or municipality
	4	State or private landowner

2. INTEREST FIELDS

Field:	Code:	Description:
INT_1	CR	Conservation Restriction
INT_2	APR	Agricultural Preservation Restriction
INT_3	CAPR	Conservation / Agricultural Preservation Restriction
	AQR	Aquifer Protection
	AR	Air Rights
	HPR	Historic Preservation
	EASE	Easement (official restriction only)
	WR	Watershed Restriction (local)
	WRP	Wetlands Restriction (Program)
	OLI	Other Legal Restriction
	ROW	Right of Way
	LH	Lease Holding

3. GRANT PROGRAMS

Field:	Code:	Description:
		State programs:
GRANTPROG1	ALA	Aquifer Lands Acquisition
GRANTPROG2	SH	State Self-help
	USH	Urban Self-help
		Federal programs:
	LWCF	Land and Water Conservation Fund
	FF	Other federal funds

4. PUBLIC ACCESS TYPES

Field:	Code:	Description:
PUB_ACCESS (PA)		

Y	Yes (open to public)
N	No (not open to public)
L	Limited (membership only)
X	Unknown

1	Public
2	Public (residents only)
3	Public (seasonal)
4	Private (public welcome)
5	Private (members only)
6	None

5. PRIMARY PURPOSE

Field: Code: Description:

PRIMARY_PURP (PP)

R	Recreation (activities are facility based)
C	Conservation (activities are non-facility based)
B	Recreation and Conservation
H	Historical / Cultural
A	Agriculture
W	Water Supply Protection
S	Scenic (official designation only)
O	Other (explain)
X	Unknown

6. LEVEL OF PROTECTION

Field: Code: Description:

LEV_PROT (LP)

P	In perpetuity
T	Temporary (Chapter 61, 61A, 61B, some CRs)
L	Limited (by something other than time)
N	None
X	Unknown

7. CHAPTER 61 TYPE

Field: Code: Description:

CH61_PROG

F	CH61 (Forestry)
A	CH61A (Agriculture)
B	CH61B (Recreation)
Y	In Chapter61 program; specific land use unknown

8. OWNERSHIP ABBREVIATIONS

Field: Code: Description:

FEE_OWNER (FO)	eg. M<town-id>SD = Town of <town-id> School Department
MANAGER	eg. M004 = Town of Adams
OTHER_1	eg. M004SD = Town of Adams school department
OTHER_2	MGLT = Mount Grace Land Trust
OTHER_3	(A file containing all abbreviations used in these fields, such as SD and MGLT above, is available upon request.)

9. ACQUISITION SUPPORT PROVIDED BY THE EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

Field: Code: Description:

EOEAINVOLV

1	a. Fee ownership or other legal interest held by an EOEA agency, or b. DCS contributed or administered acquisition monies
2	Conservation restriction registered with DCS and not held by an EOEA agency

ARC CODES

Field: Code:		Description
CODE	1	Town boundary
	2	Road
	3	Stream
	4	Pond or lake shore
	5	Coastline
	6	Train line
	7	Road / railroad right of way
	8	Utility right of way
	9	Not sure if feature is coincident

Public Access Board Sites Datalayer
December 1995

OVERVIEW

Massachusetts is blessed with over 1200 miles of seashore and hundreds of lakes, ponds, and streams. The Public Access Board (PAB) in the Department of Fisheries, Wildlife and Environmental Law Enforcement is charged with providing access to these many waterways. Presently, the agency oversees boat and canoe launch sites at over 170 coastal and inland locations in Massachusetts.

This point layer contains 164 sites. The principal source for this layer has been Public Access to the Waters of Massachusetts published by the PAB. Additional sites have been digitized from USGS topographic quadrangles.

This datalayer is stored as a single statewide coverage, **PAB**, in the STATE library.

ATTRIBUTES

The datalayer has a .PAT (Polygon Attribute Table) with the following items:

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME	COMMENTS
1	AREA	4	12	F	3		
5	PERIMETER	4	12	F	3		
9	PAB_SITES#	4	5	B	0		
13	PAB_SITES-ID	4	5	B	0		
17	PAGE	3	3	I	-		Page in book
20	MAINTRESP	30	30	C	-	MANAGINGAUTHORIT	Maintenance and management responsibility
50	LRAMPTYPE	8	8	C	-		Launch ramp type
58	NORAMPS	3	3	I	-		No. ramps
61	NOPARKSP	4	4	I	-		No. parking spaces
65	CONDITION	4	4	C	-		Condition of ramp
69	FEE	1	1	C	-		Fee required?
70	STKPRMT	1	1	C	-		Sticker required?
71	RESTRKT	1	1	C	-		Restrictions?
72	COMMENT	30	30	C			
102	FACNAME	35	35	C	-		Facility name
137	TOWN-ID	4	5	B	0	MASSGIS-TOWN-COD	
141	TOWN	21	21	C	-	TOWN-NAME	
162	QUADS-ID	4	5	B	0		
166	QUAD-NAME	25	25	C	-		Quad name
191	DOUBLEQUAD	18	19	C	-		

Note: Shapefiles cannot handle info item names longer than 10 characters. If you are working with shape files see the MASSGIS provided file, INFO2SHP.DBF for the translation table.

MAINTENANCE

Maintained by DFWELE GIS program in cooperation with the Public Access Board

Canoe Trips and Access Points Datalayers
March 1997

OVERVIEW

This layer consists of two coverages: an arc coverage representing canoe trips and a point coverage representing canoe access and portage sites. It is not yet statewide in extent. Currently it covers the Merrimack River Basin System (Megabasin). These coverages are stored in the STATE library. The layer names are **CANOETRIPS** and **CANOEACCESS** with coverage names **RIVTRIP** and **RIVRECPT**, respectively.

The trip coverage was derived from the Appalachian Mountain Club's River Guide. It represents canoe trips and associated portages and was created by selecting arcs from MassGIS 1:25,000 hydro based on descriptions in the River Guide. Centerlines were created where needed to obtain a single line coverage. The coverage uses look-up tables for storing its trip and portage related information.

The access points coverage was created using not only the AMC River Guide, but Nashua River Watershed Association and Merrimack River Watershed Council guides as well. Trips from those guides were not recorded. Where applicable, trip ids were stored with the points. Access points were located by relating descriptions in the river guides to MassGIS road and river datalayers. In some cases, the organizations were called for clarification.

ATTRIBUTES

There are five lookup tables associated with the point coverage: RIVRECPT.DRT (directions about access or portage); RIVRECPT.DSC (description of site); RIVRECPT.FAC (description of parking or boat ramp); RIVRECPT.OWN (description of owner of site); RIVRECPT.MAN (description of manager of site); and two lookup tables associated with the line coverage: RIVTRIP.PRT (portage information) and RIVTRIP.TRP (trip information), see detailed list of items in the line coverage lookup tables below.

NOTE: Shapefiles cannot handle info item names longer than 10 characters. If you are working with shape files see the MASSGIS provided file, INFO2SHP.DBF for the translation table.

Items in the RIVTRIP.AAT

TRIPNO	Unique id for each trip in the coverage which is used to relate to the Rivtrips.lut and the Portages.lut
TYPE	Formatted as XY, where X = 'T' and represents a trip segment (TS); or where X = 'P' and represents a portage. Y = the number of the portage in trip (ie: 1st portage or 2nd portage...)

Items in the RIVRECPT.PAT

RIVRECPT-ID	Unique id for each point in the coverage which is used to relate to the following point .luts (RIVRECPT.DSC; R IVRECPT.FAC; RIVRECPT.OWN; RIVRECPT.MAN; RIVRECPT.DRT)
AMC90A	Composite id of AMC trip points. Includes AMC trip #, point type (Trip or Portage); point # within a trip, beginning or ending id and AMC page #. See Examples below for an example of points along the Squannacook River.
SARIS-ID	Unique ID of river
AMC90B	Composite id identifying point in terms of second trip in which it occurs in the AMC River Guide. (NOTE: Used in lieu of an "intersection table" since INFO does not handle multiple sequential joins.)
AMC90C	Composite id identifying point in terms of third trip in which it occurs in the AMC River Guide (See note above.)
PAB_SITES-ID	Unique id representing Public Access Sites, refers back to ID in MASSGIS PAB datalayer.
MRWC87	Access point from Merrimack River Watershed Council, 1987.
TNRCG94	Access point from The Nashua River Canoe Guide, 1994.

The following items are included in the RIVRECPT.PAT to simplify identifying whether or not additional information exists in a look-up table.

PTDIRECTTRUE	Yes or No? Go to RIVRECPT.DRT for directions about portage from river or access from road to site.
PTDESCRIPTTRUE	Yes or No? Go to RIVRECPT.DSC for description of site.
PTFACILTRUE	Yes or No? Go to RIVRECPT.FAC for description of parking availability or boat ramp.
PTOWNTRUE	Yes or No? Go to RIVRECPT.OWN for decription of owner of site where available.
PTMNGTRUE	Yes or No? Go to RIVRECPT.MAN for description of manager of site where available.

ACPERMISSIONREQ Permission required from owner or manager to use access point, Yes or No?

Items in the RIVTRIP.TRP

TRIPNO	trip number and relate item to .pat
SOURCE	source of trip - AMC RIVER GUIDE, 1990
TRIPNAME	name of trip in AMC River Guide
YEARCHECK	year in which trip data was checked for AMC River Guide
SARIS-ID	unique river id
MILES	length of trip
NAVIG	describes navigability of water
SCENERY	scenery found along trip
TILES	name of quad
BASIN	name of river basin
PORTAGE	number of portages
HAZOBSTR	describes hazardous obstructions mentioned in text
DESCRIPTION	describes water passage (flat,quick,pond,tidal, etc)
COMMENTS	comments from text- may highlight dangers or scenic sites

Items in the RIVTRIP.PRT

TRIPNO	trip number and relate item to .pat
SOURCE	source of portage - AMC RIVER GUIDE 1990.
PORTNO	portage number
DISTFRBEG	distance of portage from beginning of trip
LENGTH	length of portage
DWNSTRMSIDE	side of river portage found
OBSTACLE	reason for portage
LOCATION	town

NOTE:

To relate from the point coverage to its look up tables use the following: in the .pat use the item - RIVRECPT-ID to the item in the .lut - ACCESSPTS-ID.

To relate from the line coverage to its lookup tables use the following: in the .aat use the item - TRIPNO to the item in the .lut - TRIPNO

Example of a relate from the RIVRECPT.PRL table. Use RELATE RESTORE to refer to any of the relates needed to recover the data from the .luts:

```
RELATION=  DIRREL
TABLE-ID=   $BASIN/DATABASE/RIVRECPT.DRT
DATABASE=INFO
ITEM=        RIVRECPT-ID
COLUMN=    ACCESSPTS-ID
TYPE=        LINEAR
ACCESS=    RO
```

Example of AMC90A attributes along the Squannacook River.

AMC90A HOW THE ITEM DECODES

08T1B204 trip # 08; Trip; 1st put in option* for beginning of trip; page 204 indicates first mention of trip in book
08T1E204trip # 08; Trip; 1st take out option* for ending of trip; page 204 indicates first mention of trip in book
08T2E204trip # 08; Trip; 2nd take out option for ending of trip; page 204 indicates first mention of trip in book
08P1B204trip # 08; Portage; beginning of 1st portage; page 204 indicates first mention of trip in book
08P1E204trip # 08; Portage, end of 1st portage; page 204 indicates first mention of trip in book
08P2B204trip # 08; Portage, beginning of 2nd portage; page 204 indicates first mention of trip in book
08P2E204trip # 08; Portage, end of 2nd portage; page 204 indicates first mention of trip in book
08P3B204trip # 08; Portage, beginning of 3rd portage; page 204 indicates first mention of trip in book
08P3E204trip # 08; Portage, end of 3rd portage; page 204 indicates first mention of trip in book
08P4B204trip # 08; Portage, beginning of 4th portage; page 204 indicates first mention of trip in book
08P4E204trip # 08; Portage, end of 4th portage; page 204 indicates first mention of trip in book

*Option refers to the possibility of more than one put in site for the beginning of a trip or more than one take out site for the ending of a trip.

Scenic Landscapes Datalayer
July 1999

OVERVIEW

The Scenic Landscapes datalayer depicts areas identified as part of the Massachusetts Landscape Inventory Project, Department of Environmental Management, 1981. The data is general in nature and is intended for general planning purposes only. DEM's office of Historic Resources is currently launching a project to inventory significant cultural, historic, and scenic landscapes. This effort may update or even replace this data layer. The layer is stored as a single statewide coverage named **SCEN-INV**.

PRODUCTION

This datalayer was digitized by staff at The Trustees Of Reservations. The information was digitized from a map contained within the Landscape Inventory Project report. MassGIS processed the coverage for linework generalization and smoothing.

ATTRIBUTES

The attribute SCENIC is coded "Y" for all polygons designated as scenic. Six polygons coded "N" are non-scenic areas surrounded by scenic landscapes.

MAINTENANCE

The Department of Environmental Management is maintaining this datalayer. For more information contact Patrice Kish, Director of the Office of Historic Resources (617) 626-1378.

State Register of Historic Places Datalayers
January 2000

OVERVIEW

The State Register of Historic Places (SRHP) datalayers consist of both point and polygon coverages which represent locations or boundaries of significant historic properties and sites with legal designations under several specific local, state and federal statutes (see designations under Attributes, below). The SRHP was established by MGL ch. 9 ss. 26-27c as amended by Chapter 152 of the Acts of 1982 and Chapter 254 of the Acts of 1985, and is maintained by the Massachusetts Historical Commission (MHC) in the Office of the Secretary of the Commonwealth. Historic resources in the SRHP include buildings, structures, objects, sites, landscapes and districts. Locational information on archaeological sites in the SRHP is not a public record, and therefore archaeological sites are not included in the current datalayers. A separate datalayer for SRHP archaeological sites is under development. The data are stored as five separate statewide coverages, named SRHP1, SRHP2, SRHP3, SRHP4 (all polygon coverages), and SRHPPT (a point coverage).

All maps displaying these layers must include the following disclaimer:

> "Historic Districts - Massachusetts Historical Commission: This is a beta version and does not reflect listings past 1997. Users should consult the most recent State Register of Historic Places (available at the State House Bookstore) for updates. Listings are regularly updated in the weekly State Register."

PRODUCTION

MHC staff developed these datalayers. The information was compiled on and digitized from USGS 7.5 minute quads at 1:25000 and 1:24000 scales, and from a variety of other source maps on file with the MHC. The accuracy of these maps varies, and editing of the datalayers continues. For smaller parcels and those for which parcel boundaries are not available, a center point has been digitized (stored in SRHPPT). Boundaries have been digitized for larger properties and districts (SRHP1-4). Due to overlaps in districts, polygons are currently contained in four coverages. Future updates will attempt to combine the data into one layer. Parcel and district boundaries are for planning purposes only, and are not currently accurate at the local parcel scale.

ATTRIBUTES

The SRPH polygon datalayers include the following attributes:

MHCN	MHC's unique identifier for a property, either a three-character town code followed by a numeric id, or a four-digit temporary numeric id.
TOWN	Three-character town code.
HISTNAME	Historic name of the property as it appears in the SRHP.
ST_NO	Street number of street address line.
STREET_NAM	Street name of address line.

The following 11 attributes represent codes for SRHP designations. Association of a designation with a property is signified by a "Y" in the designation field. Definitions of these designations appear in the published version of the SRHP.

LL	Local Landmark
MAHL	Massachusetts Archaeological Landmark or Massachusetts Historic Landmark
NHL	National Historic Landmark
NRDIS	National Register District
NRDOE	National Register Determination of Eligibility
NRIND	National Register Individual property
NRMPS	National Register Multiple Property Submission
NRMRA	National Register Multiple Resource Area
NRTRA	National Register Thematic Resource Area
PR	Preservation Restriction
LHD	Local Historic District

For proper display of the polygon layers use the selection USERID not equal to 0. The SRHPPT point coverage also contains LATITUDE and LONGITUDE location items.

MAINTENANCE

These layers are up-to-date through 1997. New listings are added to the SRHP on a weekly basis. It is expected that updated versions of the SRHP GIS datalayers will be released on a yearly basis at about the same time as the annual re-publication of the SRHP each January. More information on the MHC may be found at http://www.state.ma.us/sec/mhc/. Questions on these GIS data may be directed to Michael Steinitz at the MHC at (617) 727-8470.

Landmarks Datalayer
March 1996

OVERVIEW

MassGIS has derived a coverage of point landmarks from the 1990 U.S. Census TIGER Line files database. The datalayer, named **LANDMARK** and stored in the STATE library, contains the locations of schools, campgrounds, hospitals, etc. Point attributes were created from TIGER Type7 files.

ATTRIBUTES

The **LANDMARK.PAT** (point attribute table) contains these items:

RT	Record type
VERSION	Version number
STATE	FIPS State code
COUNTY	FIPS County code
LAND	
SOURCE	Data source code (see list below for details)
CFCC	Census feature class code (see list below for details)
LANAME	Landmark name
LONG	Longitude
LAT	Latitude

Census feature class codes:

D00 - Unclassified landmark feature
D24 - Marina
D28 - Campground
D31 - Hospital
D36 - Jail or detention center
D37 - Federal penitentiary or state prison or prison farm
D42 - Convent or monastery
D43 - Educational institution
D44 - Religious institution
D51 - Airport or airfield
D52 - Train station
D53 - Bus terminal
D54 - Marine terminal
D63 - Office building or office park
D65 - Government center
D71 - Lookout tower
D81 - Golf course
D82 - Cemetery
D85 - State or local park or forest

Source codes:

D - Census Bureau Precensus Update
E - Census Bureau Enumerator Update
F - Census Bureau - Other operations
G - Unconfirmed local official updates

MAINTENANCE

MassGIS is maintaining this layer.

Natural Heritage & Endangered Species Program Priority Habitats of Rare Species Datalayer

June 1999

OVERVIEW

The Priority Habitats of Rare Species (PHAB) datalayer consists of polygons that represent estimations of important state-listed rare species habitats in Massachusetts. These habitats are based on rare species population records maintained in the Natural Heritage & Endangered Species Program (NHESP) database. The polygons are spatially represented at 1:25000 or 1:24000 on the Program's series of USGS topographic maps. Program scientists draw approximate habitats by analyzing population records, species habitat requirements, and available information about the landscape (particularly from topographic maps and aerial photographs). Most habitat sites are not visited prior to the drawing of these habitats.

These polygons are NOT equivalent to “significant habitat" as may be designated according to the regulations of the Massachusetts Endangered Species Act (MESA). Priority habitats are not protected under the Massachusetts Endangered Species Act, but the rare species that use the habitats are protected by that law.

This datalayer is stored as a single statewide coverage named **PHAB9901**.

PRODUCTION

This datalayer was digitized by NHESP. The information was compiled on paper topographic quadrangles at 1:25,000 scale and was digitized from that medium. Check plots were produced at 1:60,000; all habitats were checked for coding and locational accuracy.

ATTRIBUTES

This datalayer has a polygon attribute named PHAB-LBL. The value of this item is unique for each polygon and may be used as an identifier for the polygon.

MAINTENANCE

Occurrence records from the NHESP database are continuously being added, modified and deleted. Those changes will be incorporated into the Priority Sites of Rare Species Habitats datalayer every two years. A new version of this datalayer is produced every two years, and the latest update was completed in the fall of 1999.

AVAILABILITY

The Priority Sites datalayer does not come with the MassGIS dataset by default. It may be made available to EOEA agencies and EOEA cooperators for certain projects by special request. Please contact MassGIS for access to the Priority Habitats datalayer. The name and phone number of all individuals receiving the Priority Habitats datalayer will be forwarded to NHESP. The legend that MUST accompany this datalayer on ALL maps is:

"**NHESP 1999-2001 Priority Habitats for State-Protected Rare Species: NOT equivalent to 'Significant Habitat' as designated under Massachusetts Endangered Species Act**"

Questions about the Prioirty Sites datalayer should be directed to NHESP at 508-792-7270 x161.

Natural Heritage & Endangered Species Program Estimated Habitats of Rare Wildlife Datalayer

June 1999

OVERVIEW

The Estimated Habitats of Rare Wildlife (WHAB) datalayer consists of polygons representing estimations of the habitats of state-protected rare wildlife populations that occur in Resource Areas*. These habitats are based on rare species records maintained in the Natural Heritage & Endangered Species Program's (NHESP) database. Estimated population locations are spatially represented at 1:25,000 or 1:24,000 scale on NHESP's series of USGS topographic maps. NHESP scientists draw estimated habitats by analyzing population records, species habitat requirements, available information about the landscape (particularly from topographic maps and wetland inventory maps), as well as personal observations. Most habitat sites are not visited prior to the drawing of these estimated habitats. Estimated habitats are not equivalent to Resource Area delineation. These estimated habitats are designed for use with the Wetlands Protection Act Regulations (310 CMR 10.00). Projects that are subject to the Wetlands Protection Act and that fall within Estimated Habitats of Rare Wildlife require the filing of a Notice of Intent form with NHESP.

* The definition of "Resource Area" (Area Subject to Regulation) is included in the Wetlands Protection Act Regulations (310 CMR 10.02(1)).

This datalayer is stored as a single statewide coverage name **WHAB9901**.

PRODUCTION

This datalayer was digitized by NHESP. The information was compiled on and digitized from USGS 7.5 x 7.5 minute quadrangle, topographic maps at 1:25,000 and 1:24,000 scales. Polygons are checked for locational accuracy.

ATTRIBUTES

This datalayer has a polygon attribute named MAP-LBL. The value of this item for each polygon is unique; it may be used as an identifier for the polygon.

MAINTENANCE

Occurrence records from the NHESP's database are continuously being added, modified and deleted. Those changes are incorporated into this datalayer every two years. Habitats drawn for rare wildlife occurrences that have not been reverified within the last twenty-five years are deleted. A new version of this datalayer is produced every two years, and the next update is scheduled to be complete in the fall of 1999.

AVAILABILITY

The Estimated Habitats of Rare Wildlife datalayer does not come with the MassGIS dataset by default. It may be made available to EOEA agencies and EOEA cooperators for certain projects by special request. Please contact MassGIS for access to the Estimated Habitats datalayer. The name and phone number of all individuals receiving the Estimated Habitats datalayer will be forwarded to NHESP. The legend that MUST accompany this datalayer on ALL maps is:

"**NHESP 1999-2001 Estimated Habitats of Rare Wildlife:**
For Use with the MA Wetlands Protection Act regulations (310 CMR 10)."

Estimated Habitat maps are available for viewing at local Massachusetts conservation commission offices (by town) or in the current Natural Heritage Atlas (by quadrangle map). Questions about this datalayer should be directed to NHESP at 508-792-7270 x161.

Natural Heritage & Endangered Species Program Certified Vernal Pools Datalayer
June 1999

OVERVIEW

This datalayer contains points for all vernal pools which have been certified by the Natural Heritage & Endangered Species Program (NHESP) according to the Guidelines for Certification of Vernal Pool Habitat (5/88, MA Division of Fisheries & Wildlife). The 1999-2001 version of the datalayer shows all pools that were certified as of June 30, 1999. Vernal pools are small, shallow ponds characterized by lack of fish and by periods of dryness. Vernal pool habitat is extremely important to a variety of wildlife species including some amphibians that breed exclusively in vernal pools, and other organisms such as fairy shrimp which spend their entire life cycles confined to vernal pool habitat. Many additional wildlife species utilize vernal pools for breeding, feeding and other important functions. Certified vernal pools are protected if they fall under the jurisdiction of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00). Certified vernal pools are also afforded protection under the state Water Quality Certification regulations (401 Program), the state Title 5 regulations, and the Forest Cutting Practices Act regulations. However, the certification of a pool only establishes that it functions biologically as a vernal pool. Certification does not determine that the pool is within a resource area protected by the Wetlands Protection Act. The Certified Vernal Pools layer is stored as a single coverage named **CVP9901**.

PRODUCTION

The certified vernal pool data is mapped on 1:24,000 or 1:25,000 USGS topographic quadrangle maps. The datalayer was created by NHESP by generating a coverage from a database of latitude and longitude points, as those were read from the USGS quads.

ATTRIBUTES

This datalayer has no attributes other than those normally created in an INFO point attribute table.

MAINTENANCE

Occurrence records from the NHESP's database are continuously being added, modified and deleted. Those changes are incorporated into the Certified Vernal Pools datalayer every two years. A new version of this datalayer is produced every two years, and the latest update was completed in the fall of 1999.

AVAILABILITY

The Certified Vernal Pools datalayer does not come with the MassGIS dataset by default. It may be made available to EOEA agencies and EOEA cooperators for certain projects by special request. Please contact MassGIS for access to the Certified Vernal Pools datalayer. The name and phone number of all individuals receiving the Certified Vernal Pools datalayer will be forwarded to NHESP. The legend that MUST accompany this datalayer on ALL maps is:

"**NHESP 1999-2001 Certified Vernal Pools**"

Questions about this datalayer should be directed to NHESP at 508-792-7270 x161.

Natural Heritage & Endangered Species Program Potential Vernal Pools Datalayer
December 2000

OVERVIEW

This datalayer identifies the locations of more than 29,000 potential, unverified, vernal pool habitats. Vernal pools are small, shallow ponds characterized by a lack of fish and annual or semi-annual periods of dryness. Vernal pool habitats are extremely important to a variety of wildlife species, including some amphibians that breed exclusively in vernal pools, and other organisms such as fairy shrimp which spend their entire life cycles confined to such locales.

Potential vernal pools visible on aerial photographs were interpreted and included in this layer. However, this datalayer does not include every vernal pool in Massachusetts. Many vernal pools have not been identified due to unfavorable conditions in the landscape topography, pool physiography and/or photograph quality. Furthermore, vernal pool habitats occur in a wide variety of landscape settings, including forested swamps, bogs, and other wetlands. Vernal pools within these settings were not typically interpreted, but are nonetheless legitimate and valuable vernal pools. Also, field verification of all potential vernal pools in this study will identify errors such as the inclusion of features that are not actually vernal pools.

Potential vernal pools identified in this survey are not to be confused with Certified Vernal Pools. Data pursuant to the official "Guidelines for the Certification of Vernal Pool Habitat" must be collected in the field and presented to the Massachusetts Natural Heritage & Endangered Species Program to obtain official certification for a vernal pool. Potential vernal pools identified in this survey do not receive protection under the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00), or under any other state or federal wetlands protection laws.

This single statewide layer is stored in the State library; its coverage and layer name is **PVP**.

PRODUCTION

NHESP staff identified potential vernal pools from 1:12,000 scale, color infrared (CIR), leaf-off aerial photographs flown between late March and Early May. Statewide coverage included photos taken in 1993 (Bristol, Barnstable, Nantucket and Dukes Counties), 1999 (Plymouth, northern and southern Worcester, and eastern Franklin, Hampshire and Hampden Counties), and 2000 (Essex, Middlesex, Suffolk, Norfolk, central Worcester, western Franklin, Hampshire and Hampden, and Berkshire Counties). Using stereo pairs under a mirror stereoscope, the approximate centers of pools were located. These points were digitized in a heads-up manner onto the MassGIS black and white digital orthophotos at a scale of approximately 1:12,000.

ATTRIBUTES

The **PVP.PAT** (point attribute table) contains the following items:

TOWN_ID	3	3	I	Town ID
TOWN	21	21	C	Town Name
PVP_NUMBER	8	8	I	Unique PVP ID number

AVAILABILITY

This datalayer may be made available to EOEA agencies and EOEA cooperators for certain projects. The legend that MUST accompany this datalayer on all maps is:

"NHESP Potential Vernal Pools: NOT equivalent to Certified Vernal Pools"

Questions about this datalayer should be directed to NHESP at 508-792-7270 x307.

DEP Solid Waste Facilities Datalayer
December 1997

OVERVIEW

The Solid Waste Facility Datalayer was compiled by the Department of Environmental Protection (DEP) to track the locations of landfills, transfer stations, and combustion facilities. The statewide datalayer contains the majority of the facilities currently regulated under DEP's solid waste regulations (310 CMR 16.00 & 19.00). The 629 polygons in the datalayer include thirteen specific types of solid waste facilities (see ATTRIBUTES below) and are stored as a statewide polygon coverage, **SW**.

Please note although the majority of the polygons represent landfills, only a small fraction of those landfills are active. In addition, this datalayer does not contain all solid waste facilities known to DEP. The MassGIS land-use datalayer has waste site and mining classifications that may represent landfills not in the solid waste datalayer.

MANUSCRIPT

The solid waste datalayer was originally digitized from USGS Quadrangle maps (1:25,000) filed as part of the operating permit (310 CMR 19.00) or siting (310 CMR 16.00) requirements for landfills. It has been updated as described below.

METHODOLOGY

1994 and earlier: DEP regional office files were searched for quadrangle locus maps which designated the location of solid waste facilities. In some cases the footprint of the facility was located on the map, in other instances a general location was marked on the map. These were hand-drawn onto a master set of quadrangle maps from which the datalayer was digitized. When possible, point locations were updated with polygons from MassGIS's 1985 land use data. Point locations were buffered to reflect the reported acreage (when insuffucient data was available, 29.7 acres was used).

1997 and beyond: Locus maps from regional and Boston office files were automated directly into Arc\Info while using scanned USGS quads as a background image. Point locations were buffered as described above; several of these point locations were collected using global positioning systems technology (GPS). One polygon was copied from the Protected and Recreational Open Space Datalayer.

The Department of Environmental Protection will continue its program of field checking existing facilities using GPS. 1:5,000 orthophoto basemaps will also be used for site verification. DEP plans to use GPS during site inspections to further enhance the quality of the datalayer.

ATTRIBUTES

The datalayer structure has been updated. Attributes associated with each polygon include:

ACRES	Facility Area in Acres
DIG-METHOD	Data Input Method
REGION	DEP Administrative Region
LNK	Link to SW.IDS

A related table **SW.IDS** contains the one or many Facility Identification Numbers that may be associated with a given polygon. Facility IDs are assigned according to Facility Type (two-character abbreviation), Town (digits preceeding decimal), and a unique identifier (digits following decimal). The relate item LNK is a concatenation of the town-id and a character representing the unique identifier (001 = A, 002 = B, etc).

Items found in **SW.IDS**:

REGION	DEP Administrative Region

LNK	Link to SW.PAT
FAC-ID	Facility Identification Number
TYPE	1 = Landfill, 2 = Combustion Facility, 0 = Other (CO, EP, IL, RE, TI, TR)

Types of Facilities (SW.TYPE-FREQ):

AL -Ash landfill; takes or has taken only ash.
CO - Compost site; a registered yard waste composting site.
DL - Demolition landfill; takes or has taken only construction & demolition (C&D) waste and may take wood waste.
EP - Epic (Unconfirmed) Site; identified by aerial photos taken around 1972-74 by Water Supply as possible solid waste sites, or a site with minimum data to support its existence. When a site is verified, its type is changed to a more specific site type.
IL - Illegal; solid waste facility that requires site assignment by the local Board of Health but has not obtained it and continues to operate. Most commonly refers to illegal transfer station operations.
MI - Municipal incinerator; burns MSW (Municipal Solid Waste) without energy recovery.
RE - Recycling facility; materials recovery facility or other recycling operation that does not require site assignment. RE does not include Recycling Drop-off Centers.
RR - Resource Recovery Facility; burns MSW with mass burn or refuse derived fuel technology with energy recovery.
SL - MSW landfill; may take or have taken MSW, in addition may take or have taken wood waste, C&D, sludge, ash or other solid waste. SL includes historic open or burning dumps used to dispose of MSW.
SG - Sludge landfill; takes or has taken sludge from water supply or waste water treatment only. These landfills are primarily tracked and regulated by DEP Division of Water Pollution Control.
SD - Stump landfill or wood reclamation facility; takes or has taken only clean wood waste.
TI - Tire pile
TR - Transfer station; any facility that handles, but does not dispose of solid waste and requires site assignment.

e.g.
LNK=004ABDDEQE-ID=SL0004.001TYPE=1
- A sanitary landfill in Adams (TOWN-ID 4), the first registered facility in the town.
LNK=004ABDDEQE-ID =TR0004.002TYPE=0
- A transfer station in Adams (TOWN-ID 4), the second registered facility in the town.
LNK=004CDEQE-ID=SG0004.003TYPE=1
- A sludge landfill in Adams (TOWN-ID 4), the third registered facility in the town.
LNK=004ABDDEQE-ID=CO0004.004TYPE=0
- A compost site in Adams (TOWN-ID 4), the fourth registered facility in the town

Note: SL0004.001, TR0004.002 and CO0004.004 are represented by the same polygon (LNK = 004ABD). SL0004.001 and SG0004.003 are both landfills (TYPE = 1), located at different polygons (LNK = 004ABD and 004C).

DEP maintains the Solid Waste Facility Database which tracks the liner and operational status, facility type, capacity, owner and operator contact information, and years of operation of solid waste facilities. A subset of this database is found within the SW datalayer (**SW.DB**). Facility information is linked to the GIS datalayer via the Facility ID number. The Facilities database is available through DEP's Bulletin Board: (617) 292-5546; 14400 Baud, 8 data, 1 stop, no parity; or the World Wide Web: http://www.magnet.state.ma.us/dep/bwp/dswm/swlist.htm.

The methods of data input are coded as follows in **DIG-METHOD** (**SW.DIG-FREQ**):

DIG-METHOD	Description	Number of Polygons
F	Footprint digitized from USGS quadrangle	384
P	Point digitized from USGS quadrangle	153
UTM	Point located by UTM coordinates	76
GPS	Perimeter points collected with GPS	9
LU	Polygon copied from MassGIS Land Use Datalayer	5
OS	Polygon copied from MassGIS Protected and Recreational Open Space Datalayer	1

MAINTENANCE

The DEP Bureau of Waste Prevention is maintaining this datalayer.

Underground Storage Tank Locations Datalayer
March 1997

OVERVIEW

The Underground Storage Tank Locations datalayer **(UST)** was compiled by the U.S. Environmental Protection Agency through a contract with Camp, Dresser and McKee Federal Systems, Inc. (CDM). Tabular information on tank sites was obtained from the Massachusetts Department of Public Safety's Division of Fire Protection Tanks database. Address information was extracted from the provided ASCII files and coordinates were acquired using a combination of address matching and field survey work using Global Positioning System receivers. Additional tabular information was extracted from this file by the MA Department of Environmental Protection (MA DEP). From this file of 10607 sites, 7995 were located by CDM. In 1996, the Barnstable County Department of Health and Environment (BCHED) field-visited sites in Barnstable County. The BCHED located 309 sites, of which 153 were new and 156 were previously located by address matching. PLEASE NOTE THAT FUNDING RESTRICTIONS PREVENTED ALL OF THESE SITES FROM BEING LOCATED AND INCLUDED IN THE DATALAYER. If you can provide the locations of missing sites, send a map manuscript showing the site and its USTID to MassGIS at the address on the front cover of this guide. This coverage, **UST**, is stored as a single coverage in the **STATE** library.

METHODOLOGY

A report image file was provided to CDM from the MA Department of Public Safety (DPS) on diskette(s). The site address and USTID information were extracted from this file, and duplicate records were removed. During the early part of the collection effort, fire chiefs from municipalities throughout Massachusetts were contacted and provided information for 276 new tank sites. The address matching software MATCHMAKER/GDT from Geographic Data Technologies Corp. was used to spatially locate the sites using address data from the U.S. Bureau of the Census TIGER/LINE files. Sites that were not located by this method were located using Global Positioning System survey equipment from Trimble Equipment Corp; these point locations were then provided to MA DEP GIS staff. Specific information concerning the tanks and contents at each location were then extracted from the DPS image file and loaded into a tabular database file. The content information was edited to minimize the types of products and a general category item was added. Information about total content at each site was also generated, and is a part of the coverage.

ATTRIBUTES

The datalayer has a .PAT (point attribute file) associated with each location:

USTID	The DPS Site Identification Number
METHOD	The method by which the point was mapped: ADDRESS, address matched; GPS or GPS-EPA located by GPS; GPS-BCHED located by BCHED
FACIL-NAME	The name of the facility
STREET-NUM	The street number portion of the address
STREET	The street name or intersection
TOWN	The municipality in which the UST is located
STATE	The state in which the UST is located
ZIP	The Postal Service Zip Code
QC	The QC field was created to place flags that may be of use to future researchers. The codes include:
DUPLICATE1	For two or more records in the original data file, the site name is the same or nearly the same, and the address is the same
DUPLICATE2	For two or more records in the original data file, the site name is different but the address is the same
REMOVED	The municipality responded that the tanks have been removed
REMOVING	The municipality responded that the tanks are being removed
FILLED	The municipality responded that the tanks have been filled
ADDED	The record was added by the municipality
INACTIVE	The municipality reported that the tanks are no longer in use
NO RECORD	The municipality reported no record of a UST at this site

Several data files were created from the DPS site information file. These files are all related to the coverage .PAT file by the USTID field:

UST.SITE-LIST, a list of site specific information. Attributes include:

USTID	The DPS UST identification number
COUNTY	The Massachusetts county the site is located in
NAME	The owner or operator's name
ADDRESS	The street address
CITY	The city or town the site is located in
ZIP	The Postal Service Zip Code
MANAGER	The site manager
PHONE	The phone number at the site

UST.ACTIVE, or UST.REMOVED, lists of active and removed tank information by site. Attributes include:

USTID	The DPS UST identification number
TANKID	Tank number by site
STATUS	The status of the tank, i.e. "Curr, temp, Perm, Remv"
PRODUCT	The contents of the tank, i.e. "#2 Diesel Fuel, Toluene"
CATEGORY	A more general product description, added to aid summary by sites. Only exists in UST.ACTIVE. Current codes included are: CHEMICAL, DIESEL, FUEL OIL, GAS(eous), GASOLINE, GLYCOL, HAZARDOUS, KEROSENE, LUBRICANT, MIXTURE, NONE, SOLID, UNKNOWN, WATER
CAPACITY	Tank capacity in gallons
AGE	Tank age in years, updated to 9/94
YEAR-INSTALLED	Year the tank was installed
MATERIAL	Tank construction material, i.e. "Fiberglass"
PIPING-MAT	Connecting pipe construction material, i.e. "Bare Steel"
PIPING-TYPE	Connecting pipe type. i.e. "Gravity Fed"

Additional files were generated using a frequency filter for site specific totals of material stored to aid in map generation:

UST.SITE-PRODUCTS, a summary file for each site by type of product. Attributes include:

CASE#	A sequential record number
FREQUENCY	Count of each product type
USTID	The DPS UST identification number
PRODUCTS	Tank contents
GALLONS	Total gallons at site by product

UST.SITE-CATEGORY, a summary file for each site by content category. Attributes include:

CASE#	A sequential record number
FREQUENCY	Count of each product type
USTID	The DPS UST identification number
CATEGORY	Tank contents category
GALLONS	Total gallons at site by product

The original table from the Barnstable County Department of Health & Environment is attached to the coverage as UST.BCHED. Please contact the Department for information pertaining to the fields.

MAINTENANCE

The MA Department of Environmental Protection, GIS Group, is maintaining this datalayer. Any updates sent to MassGIS will be forwarded to DEP and incorporated into this datalayer. Please reference the USTID when informing us of new or corrected data.

DEP Wellhead Protection Area (Zone II, IWPA, IWPACOM) Datalayers
March 2001

OVERVIEW

Wellhead protection areas are important for protecting the recharge area around public water supply (PWS) wells. A Zone II is a wellhead protection area that has been determined by hydrogeologic modeling and approved by the Department of Environmental Protection's (DEP) Drinking Water Program (DWP). In cases where hydro-geologic modeling studies have not been performed and there is no approved Zone II, an Interim Wellhead Protection Area (IWPA) is established based on DEP DWP well pumping rates or default values. Certain land uses may be either prohibited or restricted in both approved (Zone II) and interim (IWPA) wellhead protection areas.

Approved Wellhead Protection Areas (Zone II)

The statewide **ZONE_IIS** datalayer contains DEP Approved Wellhead Protection Areas (Zone II). As stated in 310 CMR 22.02, a Zone II is:

> "That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides that result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedorck , or a recharge boundary)."

DEP Zone II and PWS data are closely linked, and DEP Zone II data should be used in association with the DEP Public Water Supply datalayer (PWS_DEP). During the approval process each Zone II is assigned a unique ID (ZII-NUM) by DEP DWP. The DEP Public Water Supply and Zone II datalayers use the ZII-NUM to link protected PWS sources to their approved Zone II. Since some PWS sources within a Zone II may not have been used to delineate that Zone II, the ZII-NUM item can be used to identify the specific wells for which a Zone II was delineated. If the DEP Public Water Supply datalayer item ZII-NUM is equal to 0 than that PWS source has no Zone II and should therefore have an Interim Wellhead Protection Area (IWPA).

Zone II MANUSCRIPTS

Zone II delineation maps, based on USGS (1:25,000) topographic quadrangles, are submitted to the DEP DWP as a requirement for Zone II approval and are considered to be the Department's "official" Zone II maps. Traditionally consultants submitted these maps in hardcopy/analog format. Since 1999, Zone II data developed under DEP's Source Water Assessment Program (SWAP) is submitted by the consultant in a digital (ESRI shapefile) format. It is strongly recommended that if Zone IIs are to be used in site level analysis, the original hardcopy manuscript documents, located at DEP's Boston Office, be referred to for evaluation of any critical, site specific information. Please refer to the section below on data maintenance for DEP DWP contact information.

Zone II METHODOLOGY

Historically the "official" Zone II paper maps were used to recompile Zone II boundaries into the DEP Water Supply Protection Atlas, which consisted of stable mylar overlays based on the USGS 7.5 minute (1:25,000) topographic quadrangles. Prior to January 1996 Zone IIs were automated using the following methodology. After the technical reports were reviewed for completeness, the Zone II boundaries were transferred to a USGS-based stable mylary overlay. The Zone IIs were

then inked onto the Water Sources overlay using a size 0 (.35 mm) pen and tablet digitized by GIS Program staff.

As of January 1996 the automation steps of recompiling the Zone II boundary onto the DEP Water Supply Protection Atlas Water Source overlay and tablet digitizing have been abandoned. Zone II boundaries are currently generated by one of the following methodologies:

- After the technical reports are reviewed for completeness and approved by DEP DWP technical services staff the DEP GIS Program is provided an analog copy of the "official" Zone II map. The Zone II map is scanned into a .tif image and then converted to an ESRI GRID image. Using the GRID as a background feature a minimum of four (4) tics are added to an empty Zone II template coverage. Rasterized Zone II data is converted to vector format by tracing the Zone II boundary on the underlying GRID. The vectorized Zone II boundaries are transformed into NAD83 Massachusetts state plane meter coordinates. New Zone IIs are appended to the statewide Zone II datalayer and regionalized.

- After the technical reports are reviewed for completeness and approved by DEP DWP technical services staff the DEP GIS Program is provided a digital copy of the "official" Zone II boundary generated by the consultant. New Zone IIs are appended to the statewide Zone II datalayer and regionalized.

Zone II ATTRIBUTES

Regional Topology Data Model:

Because wells tend to be clustered by the nature of the resource they tap, the Zone IIs protecting those wells will frequently overlap. As a result of this overlap, intersecting Zone IIs are composed of multiple polygons and more than one Zone II can share an individual polygon. The regions data model represents complex area features and supports overlapping or non-contiguous areas. The Zone II data layer uses the regions feature class and topological structure to manage polygonal overlap, by combining all the polygons a Zone II comprises into a single region feature subclass (**ZONE2**).

With regions based topology, an individual Zone II can be selected by using the item **ZII-NUM** in the region subclass **ZONE2** attribute table. The **ZII-NUM** is assigned by DEP DWP. The **ZII-NUM** item is also maintained in the .PAT of the DEP Public Water Supply datalayer, and can be used to identify the specific wells for which a Zone II has been delineated.

Region Attributes:

The **ZONE_IIS** datalayer contains regional topology and subclass **ZONE2** and region attribute table (.PATZONE2) with the items:

ZONE2-ID	ID of the region
ZII-NUM	The unique number assigned by DEP DWS to identify each Zone
AREA-ACRES	The area of the Zone II in acres

Polygon Attributes:

The **ZONE_IIS** datalayer has polygon topology and polygon attribute table (.PAT) with the following items:

AREA-ACRES	Area of the polygon in acres
ZONE	Zone type (2 = Zone II, 3 = Zone III Inlyer)

Arc Attributes: The **ZONE_IIS** datalayer has line topology and an arc attribute table (.AAT) with the following items:

ZONE_IIS-ID	ID of the arc of the Zone II calculated to the value of ZII-NUM
ZII-NUM	The unique number assigned by DEP DWS to identify each Zone II

Interim Wellhead Protection Areas (IWPA, IWPACOM)

In the absence of an approved Zone II, DEP has adopted the Interim Wellhead Protection Area (IWPA) as the primary, protected recharge area for PWS groundwater sources. For PWS sources that pump less than 100,000 gallons per day (GPD), the IWPA radius is proportional to the pumping rate in gallons per minute (GPM). Pumping rate is determined by DEP DWP based on one of the following methods, DWP approved pumping rate, metered data or Title 5 flow rate. The formula used for calculating the PWS well point buffer radius in feet is:

Radius = (32 x pumping rate in GPM) + 400

The minimum IWPA radius is 400 feet, the maximum (default) radius reached at 100,000 GPD (70 GPM) is 2,640 feet (1/2 mile). In instances where DWP pumping rate information is unavailable DWP approved default radius values are assigned based on PWS well classification. The default radius for community class PWS groundwater sources (GW) is 2,640 feet (804.6 meters). The default radius for non-community sources is 750 feet (228.6 meters) for Non Transient (NTNC) wells and 500 feet (152.4 meters) for Transient (TNC) wells.

The DEP GIS Program currently maintains two statewide IWPA coverages (**IWPA** and **IWPACOM**) shared through MassGIS. Both are generated by buffering groundwater sources in the DEP Public Water Supply datalayer (PWS_DEP). The **IWPA** coverage contains variable width IWPA buffers for BOTH approved community and non community groundwater sources in the DEP PWS datalayer which do not have an approved Zone II. The **IWPACOM** coverage contains IWPAs ONLY for community PWS sources which do not have an approved Zone II.

IWPA, IWPACOM METHODOLOGY

The DEP Interim Wellhead Protection Area (**IWPA** and **IWPACOM**) datalayers are simple polygon coverages generated with the Arc/INFO buffer command, based on PWS well point locations in the DEP Public Water Supply datalayer. DEP GIS-based IWPA buffer radius values are determined from the best available digital pumping rate information, as provided to the GIS Program from DWP.

IWPA, IWPACOM ATTRIBUTES

Polygon Attributes:

The **IWPA** and **IWPACOM** datalayers have polygon topology and a polygon attribute table (.PAT) with the standard buffer item:

INSIDE	Arc/INFO generated buffer item (0 or 1 = Not within IWPA, 100 = Within IWPA)

MAINTENANCE

The Zone II and IWPA data layers are maintained by the DEP GIS Program, in cooperation with DWP's Technical Services group. The DEP GIS Program updates Zone II and IWPA data on a quarterly basis (Dec, Mar, June and Sept.) in conjunction with updates to the DEP Public Water Supply datalayer and in accordance with the DWPs PWS new source approval schedule. Besides adding new Zone II and IWPA areas, updates may include modifying existing areas and removing superseded Zone IIs. Updated datalayers are then shared through MassGIS.

General and technical questions regarding DEP approved (Zone II) and interim (IWPA) well head protection areas should be referred to the DWP Technical Services Group (617) 556-1055. GIS-related questions concerning Zone II and IWPA or other DEP water supply-related data can be referred to the DEP GIS Program (617) 574-6856.

Surface Water Supply Protection Areas (Zone A, B, C) Datalayer
March 2001

OVERVIEW

These three datalayers (ZONEA, ZONEB, ZONEC) delineate those areas included in 310 CMR 22.00, the Massachusetts Drinking Water Regulations, as Surface Water Supply Protection Zones:

ZONE A: represents a) the land area between the surface water source and the upper boundary of the bank; b) the land area within a 400 foot lateral distance from the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a); and c) the land area within a 200 foot lateral distance from the upper boundary of the bank of a tributary or associated surface water body.

ZONE B: represents the land area within one-half mile of the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a), or edge of watershed, whichever is less. Zone B always includes the land area within a 400 ft lateral distance from the upper boundary of the bank of the Class A surface water source.

ZONE C: represents the land area not designated as Zone A or B within the watershed of a Class A surface water source, as defined in 314 CMR 4.05(3)(a).

All known surface water supplies have zones delineated, but some may be covered by other legislation. Areas with a status value of M are included for reference but are not covered by 310 CMR 22.00. Each area is delineated in a separate statewide datalayer, ZONEA, ZONEB, and ZONEC.

METHODOLOGY

Those areas that contribute to public surface water supplies were taken from the Drainage Sub Basins datalayer and overlaid with the 1:25,000 Hydrography datalayer to identify reservoirs and tributary streams. The reservoirs were extracted and buffered to produce Zone B's, reservoirs and tributaries were extracted and buffered to produce Zone A's, and sub basins were extracted to create Zone C's.

ATTRIBUTES

Individual polygons were generated for each surface water source for each zone designation, but since some sources lie within the watershed of another source, the regions feature class was used to create collections of polygons for each surface water source. Each coverage uses the region feature class and topological structure to manage overlap, combining all the polygons composing each source's protection zones into a single region feature class (**PWS**). Protection zones for each source can be selected by using the item **SOURCE-ID** in the region subclass **PWS** attribute table.

REGION Attributes: Each protection zone coverage contains the region subclass **PWS** and the attribute table **ZONE(ABC).PATPWS**.

The items common to each attribute table are:

SOURCE-ID	Surface water supply source-id from the public water supply datalayer
REG_OBJ_ID	Regulated Object ID from the DEP EPICS Database
STATUS	Current operational status: A – Active, E - Emergency, I – Inactive, M – MWRA source
AREA-ACRES	Area of the Zone (ABC) in acres
RESERVOIR-AREA	Area of the reservoir (if impoundment exists) in acres (see Hydrography 1:25000 Datalayer)

In addition the **ZONEB** region subclass attribute table **ZONEB.PATPWS** contains:

ZONEA-AREA	Area of the Zone A in acres WITHIN the Zone B area

In addition the **ZONEC** region subclass attribute table **ZONEC.PATPWS** contains:

ZONEA-AREA	Area of the Zone A in acres
ZONEB-AREA	Area of the Zone B in acres

Polygon attributes: The Zone C datalayer was extracted from the Drainage Sub Basins Datalayer and contains the same attributes.

MAINTENANCE

The Massachusetts Department of Environmental Protection (DEP) GIS Program is maintaining this datalayer. Any updates sent to MassGIS will be forwarded to DEP and incorporated into this data layer. Please reference the town, water supplier id, water supply source id (if known), and major basin identifier when providing updates.

Title 5 Datalayer
August 2000

OVERVIEW

The Title 5 data layer is a buffer coverage representing a variable width buffer zone around water features and other natural resources. These buffer areas are established for the purpose of aiding in the implementation of Title 5 (310 CMR 15.00) regulations for the siting, construction, inspection, upgrade and expansion of on-site sewage treatment and disposal systems, and for the transport and disposal of sewage. The buffer areas represent the setback requirements for the installation of septic systems near specific natural resources and water features. Please refer to the Title 5 regulations for the specific setback requirements.

Title 5 data are tiled by quadrangle in library QUAD as layer **T5**; coverages are named **T5.**

PRODUCTION

The buffer areas were developed by buffering the hydrologic and wetland features contained in the MassGIS 1:25,000 hydrography data layer and wetland features contained in the MassGIS land use coverage. The buffer area is 50 feet around all hydrologic features and wetlands, except within the drainage basin for a public surface water supply, where the buffer zones are 100 feet around wetland features, 200 feet around streams and ponds, and 400 feet around public surface water supplies.

ATTRIBUTES

This datalayer has a polygon attribute table (.PAT) with the following items:

INSIDE	Indicates whether area is within the Title 5 buffer zone 100 = within buffered area 0 = outside buffered area
TILENAME	ID# of the Quad tile

TITLE 5 THEME MAP

A Title 5 Resource Area Map series is available through MassGIS. This map series is intended to be used by the public as a tool to aid in identifying areas near water resources and natural features that are subject to the Title 5 (310 CMR 15.00) regulations. The information shown on these maps comes from many different sources at different scales. Some data may be incomplete, some generalization may occur, and some information may not have been field verified.

MAINTENANCE

This datalayer was developed and is maintained by the Massachusetts Department of Environmental Protection (DEP). It is updated when new hydrography, land use and public water supply information is available.

DEP Tier Classified Oil or Hazardous Material Sites (MGL c. 21E) Datalayer
March 2001

OVERVIEW

The DEP Tier Classified Oil or Hazardous Material Sites datalayer is a statewide point dataset containing the *approximate* location of oil or hazardous material disposal sites that have been (1) reported and (2) Tier Classified under M.G.L. Chapter 21E and the Massachusetts Contingency Plan (MCP). Location types featured in this datalayer include the approximate center of a site, the center of a building on the property where the release occurred, the source of contamination, or the location of an on-site monitoring well. For the purposes of this document, the terms "DEP Tier Classified oil and hazardous material disposal sites" and "Tier Classified Chapter 21E sites" are synonymous and are often referred to simply as "sites". This STATE library layer is named **C21E**; its coverage name is **BWSC_DEP**.

Releases of oil and hazardous materials are reported to the Department of Environmental Protection's (DEP) Bureau of Waste Site Cleanup (BWSC), according to procedures established in the MCP (310 CMR 40.0000). The sites mapped in this datalayer represent only a subset of the total reported Chapter 21E sites tracked by DEP BWSC. Chapter 21E sites that have not yet been Tier Classified are not contained in this datalayer.

Under Massachusetts' Waste Site Cleanup Program, which is a largely privatized program, Tier IA classified sites and Immediate Response Actions (IRAs) at any site receive direct DEP oversight. Data maintained by the DEP regarding site location are provided to the DEP by potentially responsible parties (PRPs) and by licensed site professionals (LSPs), who work for the PRPs. Location data is provided in a paper format (e.g., map and textual information) by PRPs and LSPs and maintained by DEP BWSC in individual site files. These site files are available to the public through the DEP's regional offices.

Springfield - http://www.state.ma.us/dep/wero/werohome.htm
Worcester - http://www.state.ma.us/dep/cero/cerohome.htm
Wilmington - http://www.state.ma.us/dep/nero/nerohome.htm
Lakeville - http://www.state.ma.us/dep/sero/serohome.htm

Anyone wishing to view Chapter 21E site files can make arrangements with the regional offices though a Freedom of Information request. The Department encourages persons to review these site files when they make decisions that consider a specific site. Most of the site locations included in the DEP Tier Classified Oil and Hazardous Material Sites datalayer are interpretations of data provided by PRPs and LSPS converted to a digital format by DEP staff. This data has not been field-verified. In some cases where file information was inadequate or unavailable, locations were provided by DEP technical staff through knowledge gained in the course of their professional activities.

THE STATE SUPERFUND LAW AND THE MASSACHUSETTS CONTINGENCY PLAN (MCP)

The rules requiring notification, assessment and remediation of releases of oil and hazardous materials are codified in the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000. Under the MCP and M.G.L. Chapter 21E, the PRPs are responsible for the timely assessment and cleanup of disposal sites in Massachusetts. The DEP BWSC is required to audit PRP response actions performed on 20% of the sites and when necessary provides direct agency oversight of cleanup efforts.

If permanent cleanup is not achieved for a disposal site within a year of being reported to the Department, the site must be classified as Tier I or II in accordance with the MCP's numerical

ranking system (NRS), outlined in 310 CMR 40.1500. The NRS is a point system based on a variety of factors, including the site's complexity, the type of contamination, and the potential for human or environmental exposure to the contamination. In addition, some sites are automatically given a Tier I classification if they pose an imminent hazard or affect public water supplies. A site's Tier Classification determines the level of DEP oversight. Tier I sites require a permit and Tier IA sites, considered to be the most complicated sites, require direct DEP BWSC oversight.

General and technical questions regarding Chapter 21E, the MCP and waste site cleanup in Massachusetts should be directed to the DEP BWSC Helpline at (617) 338-2255 or (800) 426-0444. Information on the Waste Site Clean-up Program is available online at http://www.state.ma.us/dep/bwsc/bwschome.htm.

DATA LIMITATIONS

Location data contained in this datalayer are based on DEP staff interpretation of information provided to the Department by PRPs and their LSPs. Point features in this datalayer should ONLY be considered as an "approximation" or "best estimate" of site locations based on the information submitted to the DEP BWSC. **The accuracy and completeness of the information submitted has not been verified by the DEP.**

There are other Chapter 21E sites in Massachusetts that are not contained in this datalayer. For example, this datalayer does not include (1) contaminated sites that have not been reported to the DEP or (2) sites for which a Response Action Outcome (RAO) has been submitted to the DEP. Furthermore, not all Tier Classified Chapter 21E sites have been located. Please refer to the Unlocated Sites List for a current list of unmapped Tier Classified Chapter 21E sites.

Tier Classified Chapter 21E site data are extremely temporal. Although the datalayer will be updated on a periodic basis, it will never be complete or up-to-date. Users should check BWSC site files (at the appropriate DEP Regional Office) for the most current information.

The DEP recognizes that point features are not the ideal spatial model for representing contaminated areas, especially in the case of large sites or if considerable contaminant migration has occurred. Due to the limitations of the information that PRPs and LSPs are currently required to submit to the DEP, the spatial representation of sites as point features is currently the only realistic method for generating Tier Classified Chapter 21E site data on a statewide scale.

Due to the limitations of this datalayer, the following disclaimer language will appear on DEP standard map products containing Tier Classified 21E site data:

> **Data Disclaimer:**
> Point locations representing Tier Classified Chapter 21E sites in this datalayer have not been field-verified and should be considered approximate. Locations were derived through review and interpretation of paper maps and textual information contained in DEP BWSC site files, which are maintained in DEP's Regional Offices. Generally, such information was submitted to DEP by potentially responsible parties (PRPs) and the PRPs' licensed site professionals (LSPs).
>
> Please be advised that this datalayer is incomplete. The DEP has been unable to locate some sites due to inadequate source material. Sites that are not yet reported or tier-classified are not mapped, nor are sites for which a Response Action Outcome (RAO) has been submitted to the DEP.
>
> Site contamination may extend well away from the point representing a site on this map. The DEP BWSC site files should be reviewed for the most accurate and up-to-date information about a particular site. While the Tier Classified Chapter 21E site data shown on this map provides some useful information, the user should be aware of the data's limitations. For further information, please see the datalayer description pages for the DEP Tier Classified Oil or Hazardous Material Sites (or online at

http://www.state.ma.us/mgis/c21e.htm on the MassGIS Web site).

Questions regarding Tier Classified Chapter 21E site data on this map should be referred to the DEP GIS Program (617) 574-6856. General and technical questions regarding Chapter 21E, the MCP and waste site cleanup in Massachusetts should be directed to the DEP BWSC (617) 338-2255 or (800) 426-0444.

DATA DEVELOPMENT

1. Source Materials

a. Data Universe

The DEP BWSC is responsible for providing the DEP GIS Program with a comprehensive listing of Tier Classified Chapter 21E sites, including street address information and unverified coordinate data. A "development coverage" was created from this data using address matched and coordinate generated data.

b. Source Manuscripts

Chapter 21E site files maintained by the DEP contain a variety of types and qualities of maps, including surveys, site plans and locus maps. DEP GIS Program staff reviewed this file information and identified the best manuscript maps and supplemental text information for locating sites. The attribute section of this document contains a listing of the types of source manuscripts utilized for this datalayer. In limited cases, textual manuscripts, contained in the site files, provided sufficient descriptive information for estimating site locations.

2. Automation Methodology

a. Point Development Tool

To facilitate conversion of paper data to a digital format, the DEP GIS Program created the Point Development Tool (PDT), a customized application using ESRI's ArcView software (the PDT application is available as an extension to the MassGIS DataViewer). The PDT provides a standardized platform that guides users through the automation and documentation of geographically referenced point data.

On-screen digitizing using the PDT and the best available manuscript map information was the primary method of automation. In situations where manuscript maps and other source information from the file record were inadequate or unavailable, DEP technical staff were asked to help locate the site based on knowledge gained in the course of their professional activities involving that site.

b. Basemap Scale

Using data in the "development coverage," the PDT navigates data developers to the general vicinity of a site. The PDT then displays the best digital base imagery available for that vicinity. The PDT uses MassGIS 1 meter (1:5,000) black and white digital orthophoto images (DOQ) as the default basemap. Where 1 meter 1:5,000 DOQs were not available, the PDT defaulted to 1 meter USGS (1:12,000) black and white digital orthophoto images or USGS (1:25,000) topographic quadrangle images respectively. When data development began, the only available digital basemap imagery for much of Massachusetts was the MassGIS scanned USGS (1:25,000) topographic images. Therefore, the base scale of this datalayer is considered to be 1:25,000.

After interpreting the source manuscripts, developers used the PDT to select a point on the base image that best represents the site location. The PDT guided the developer through the data documentation process, recording information about the type of source material, type of feature located, and an assessment of the locational accuracy of the mapped point.

ATTRIBUTES

1. Attribute Data Structure

The point attribute table (.pat) for the DEP Tier Classified Oil or Hazardous Material Sites datalayer contains the following items:

General Site Information Items:

ITEM	TYPE-WIDTH	DEFINITION
RTN	C – 9 / 9	BWSC Release Tracking Number (RTN), unique site ID
NAME	C – 50 / 50	Site name assigned by DEP BWSC describes the site in terms of its location, use or type.
ADDRESS	C – 30 / 30	Site address assigned by DEP BWSC
TOWN	C – 21 / 21	MassGIS town name
REGION	I – 1 / 1	MassGIS DEP Region code
STATUS	C – 18 / 18	Chapter 21E compliance status according to DEP BWSC
OHM_CODE	C – 18 / 18	Type of contamination according to DEP BWSC

Standard PDT Data Documentation Items:

ITEM	TYPE-WIDTH	DEFINITION
L_TYPE	C - 16 / 16	Location type
L_METHOD	C - 6 / 6	Location method
SOURCE	C – 30/30	Source material

2. Description of General Site Information Items

General site information attributes are populated using BWSC database information and represent the most up to date BWSC data, available to the DEP GIS Program, at the time of update.

a. RTN

The Release Tracking Number (RTN), is a unique 7-digit site identifier assigned to reportable releases by the BWSC. This number is preceded by either 1,2,3 or 4 (e.g. 3-0001234) according to the DEP region in which the site is located (see: description of DEP Region ID below).

b. NAME

The name assigned by BWSC that best describes the site location. The site name does NOT necessarily reflect the identity of any PRPs.

c. ADDRESS

The number and street that most accurately describes the site location; mile markers or similar highway designations may also be used.

d. TOWN

The standard MassGIS town name.

e. REGION

The DEP Region in which the site is located. This field uses the following numeric DEP Region codes:

DEP REGION CODE	DEP REGION – OFFICE LOCATION	ACRONYM
1	Western Region - Springfield	WERO
2	Central Region - Worcester	CERO
3	Northeast Region - Wilmington	NERO
4	Southeast Region – Lakeville	SERO

f. STATUS (Chapter 21E Tier Classification)

Chapter 21E Tier Classification is based on the requirements, standards and procedures set forth in 310 CMR 40.0500 or 40.0600 for classifying a site as either Tier I or Tier II and for categorizing Tier I disposal sites as Tier IA, Tier IB, default Tier 1B or Tier IC.

1.) MCP/Chapter 21E Tier Classification Definitions

TIER IA: Any site receiving a total NRS score equal to or greater than 550 is a Tier IA. Tier IA sites require a permit and any person undertaking response actions must do so under direct Departmental supervision.

TIER IB: Any site receiving a total NRS score of less than 550 and equal to or greater than 450 is a Tier IB. These sites also require a permit but any person undertaking response actions may do so without the Department's approval after a Tier I Permit is issued.

TIER IC: Any site receiving a total NRS score of less than 450 and equal to or greater than 350 is a Tier IC. In addition, any release / site receiving a total NRS score of less than 350 and that meets any of the Tier I Inclusionary Criteria specified in 310 CMR 40.0520(2)(a) shall also be classified as Tier IC. These sites also require a permit but any person undertaking response actions may do so without the Department's approval after a Tier I Permit is issued.

TIER 2: Any site receiving a total NRS score of less than 350 is a Tier 2, unless the release / site meets any of the Tier I Inclusionary Criteria specified in 310 CMR 40.0520(2). Permits are not required at Tier 2 sites and response action may be performed under the supervision of a Licensed Site Professional, without prior Departmental approval.

DEF TIER 1B: (Default Tier 1B) A site where the responsible party fails to provide a required submittal to DEP by a specified deadline. A site is categorically classified as a Default Tier 1B on the date of their applicable transition deadline and is assessed Tier 1B annual compliance fees should the responsible party fail to submit to the Department by the applicable deadline one of the following:

a) An LSP Evaluation Opinion stating the location is not a site where a release of oil and / or hazardous material has occurred which is subject to the notification requirements of 310 CMR 40.0300, and no further actions are required.

b) An LSP Evaluation Opinion stating that a release of oil and / or hazardous material subject to the notification requirements of 310 CMR 40.0300 has occurred or may have occurred at the location but response actions completed prior to the date of the LSP Evaluation Opinion meet the requirements of a Class A or Class B Response Action Outcome pursuant to 310 CMR 40.1000.

c) An LSP Evaluation Opinion stating that the release / site is a location that is adequately regulated pursuant to 310 CMR 40.0110.

d) A Response Action Outcome Statement pursuant to 310 CMR 40.1000.

e) A Tier Classification Submittal pursuant to 310 CMR 40.0700.

g. OHM_CODE

Contamination types are classified by BWSC as petroleum (oil), hazardous material, or oil and hazardous material. The following codes are used to indicate the type of contaminant released.

CODE	DEFINITION
O	Oil, includes gasoline, or other petroleum based material
HM	Hazardous material
OHM	Both oil (gasoline or other petroleum based material) and hazardous material

3. Description of Standard Data Documentation Items

a. L_TYPE

The location type (L_TYPE) field contains a spatial reference code, indicating what the point represents. Current location type codes include:

CODE	DEFINITION
CA	Approximate center of site investigation activity
CB	Approximate center of on-site building footprint as shown on base image
CB2	Approximate center of a building footprint, NOT positive on site.
CL	Approximate center of property lot associated with site address
CS	Approximate center of site or area of known contamination
CT	Approximate center of individual tank or cluster of tanks (UST or AST)
FD	Front Door, +/- 100-ft from entrance to site
MW	Approximate location of monitoring well(s) associated with the site
SC	Approximate source of contamination on site

b. L_METHOD

The location method (L_METHOD) field contains an alphanumeric code which provides information on both the method used to locate the site and the estimated level of data quality. The alpha portion of the code indicates the method of automation. Sites automated using the PDT have an alpha L_METHOD code of either "ORTH" or "TOPO". Location method codes containing "ORTH" indicate sites automated by on screen digitizing technique, using an orthophoto (1:5,000 or 1:12,000) image base. Location method codes containing "TOPO" indicate sites automated by on screen digitizing technique, using a USGS topographic (1:25,000) image base. For PDT automated locations, the numeric portion of the L_METHOD code represents an "estimated confidence" in the quality of the point location. This value is assigned by the mapper at the time the time of automation.

L_METHOD Codes/Criteria for Sites Automated Using the PDT:

CODE	CRITERIA
ORTH1 or **TOPO1**	Estimated to be +/-100-f t from L_TYPE
ORTH2 or **TOPO2**	Estimated to be100 – 500-ft from L_TYPE
ORTH3 or **TOPO3**	Estimated to be 500 – 1,000-ft from L_TYPE

Non-PDT location method codes such as "GPS," which indicate sites located using global positioning system (GPS) technology, have also been assigned numeric values indicating the general quality of the location.

L_METHOD Codes/Criteria for Sites NOT Automated Using the PDT:

CODE	CRITERIA
COOR1	Coordinate derived on screen by DEP technical staff, based on digital (1:5,000) orthophoto Image or coordinate pulled from survey grade map
COOR2	Coordinate derived by DEP technical staff, based on digital or analog USGS (1:25,000) topographic map or other non-survey grade map
COOR3	Derived from unverified coordinate data, self reported from regulated community, includes undocumented coordinate data from programmatic database (Note: locations from COOR3 data are not included in the datalayer)
DIGD1	Extracted from 1:5,000 base scale digital data
DIGD2	Extracted from 1:25,000 base scale digital data
DIGD3	Extracted from >1:25,000 base scale digital data
GPS_1	GPS verified location, averaged from 100+ 3D differentially corrected (DGPS) positions and mapped +/-100-ft from the target feature.
GPS_2	GPS verified location, averaged from 50-100 3D DGPS positions, or location averaged from 100+ 3D DGPS positions and mapped between 100 – 500-ft. of the target feature.
GPS_3	3D GPS verified location not conforming to GPS_1 or GPS_2 criteria. (examples: location averaged from < 50 3D GPS position, or any 3D DGPS location mapped >500-ft from the target feature.)

Note: GPS location method criteria are based on the specifications and optimal accuracy capabilities of the Trimble Navigation GeoExplorer II GPS receiver.

c. SOURCE

Codes contained in the SOURCE field indicate the type of source material used to locate the site.

Manuscript Map Source Codes:

LOCUS _<Type>	Locus map - Possible types include:	
	ATLAS	Road or street atlas based
	MGIS	MassGIS digital vector based
	ORTHO	Orthophoto based
	OTHER	Other locus types, ex. trail map
	USGS	USGS topographic quadrangle based
SURVEY_MAP	Survey grade map of site	
SITE_PLAN	Engineering site plan or map	
SKETCH_MAP	Hand sketched map of site (detailed or locus)	
TAX_MAP	Municipal tax assessment map	

Other Source Codes:

COORD_<Source>	Coordinate data, <Source> code indicates data provider:	
	BRP	DEP Bureau of Resource Protection
	BWP	DEP Bureau of Waste Prevention
	BWSC	DEP Bureau of Waste Site Cleanup
	EPA	US Environmental Protection Agency
DVD _<Source>	Digital vector data, <Source> code indicates data provider or digital datalayer:	
	21E	DEP BWSC Ch. 21E Tier Classified Oil or Hazardous Materials layer
	CCC	Cape Cod Commission
	DEV	Fort Devens
	DEP	MA Department of Environmental Protection
	FAC	DEP BWP Regulated Facilities datalayer

	MGIS	EOEA MassGIS
	MMR	Massachusetts Military Reservation
	NPL	US EPA National Priority List Datalayer
	SW	DEP BWP Solid Waste Facilities Datalayer
	UST	Underground Storage Tanks Datalayer
DPD_<Source>	Digital parcel data (see: DVD for possible <Source> codes)	
DPD_<Municipality>	Digital parcel data from MA Municipality	
GPSDS	DEP GPS field data sheets	
ORTHO_.5M	Interpolated from .5 meter orthophoto image	
ORTHO_1M	Interpolated from 1 meter orthophoto image	
ORTHO_2M	Interpolated from 2 meter orthophoto image	
SITE_VISIT	Field verified (see: L_METHOD fields for method of verification)	
STAFF_KNOW	Located by DEP staff through knowledge gained in the course of their professional activities.	
TEXT_DESC	Location determined from textual description of site	
USGS	Interpolated from 1:25000 USGS topographic quadrangle image	
VERB_DESC	Location determined from verbal description of site	
NO_DATA	No data available	

RELATED TABLES

The BWSC maintains and posts a file (wsc_all.zip) that can be downloaded from the DEP Web Site http://www.state.ma.us/DEP/bwsc/sites/sdown.htm. This compressed (.zip) file includes a database (.dbf) file containing a record for all reportable releases tracked by the BWSC, and accompanying documentation (wsc_all.doc). BWSC updates the wsc_all.dbf on a regular schedule. Tabular data records in wsc_all.dbf can be related to the Tier Classified Oil or Hazardous Materials Site datalayer by the RTN field. Please note that Tier Classified Chapter 21E sites are only a subset of the total reportable releases contained in the file wsc_all.dbf.

MAINTENANCE

The DEP GIS Program in cooperation with the DEP BWSC maintains this datalayer. Updates to this datalayer will be provided to MassGIS following the posting of updated wsc_all.zip data on the DEP Web Site. As a standard component of the update, The DEP GIS Program will remove from the datalayer sites that are no longer Tier Classified according to the latest BWSC data. The addition of new Tier Classified sites to the datalayer will be dependent on the availability of staffing resources and source information. Datalayer updates may also include refinements to existing site locations.

If you have questions regarding this datalayer, please contact the DEP GIS Program at (617) 574-6802 or (617) 574-6856. General and technical questions regarding Chapter 21E, the MCP and waste site cleanup in Massachusetts should be directed to the DEP BWSC at (617) 338-2255 or (800) 426-0444.

DEP BWP Major Facilities Datalayer
August 2000

OVERVIEW

The Department of Environmental Protection (DEP) Major Facilities datalayer is a statewide point dataset containing the location of a subset of facility types regulated by DEP's Bureau of Waste Prevention (BWP). The layer and coverage name is **BWPMAJOR**.

In a preliminary effort to begin locating facilities regulated by DEP, the BWP chose to locate facility types having the greatest potential environmental significance. At this time, the following facility types have been located:

- Large Quantity Generators of Hazardous Waste (LQG)
- Large Quantity Toxic Users (LQTU)
- Hazardous Waste Recyclers
- Hazardous Waste Treatment, Storage and/or Disposal Facilities (TSDF)
- Facilities with Air Operating Permits
- Facilities with Groundwater Discharge Permits

SOURCE

Data Universe

In April 1998, DEP's Facility Master File Database (FMF) was queried to identify facilities engaging in the activities listed above. A "development coverage" was created from this data using global positioning system (GPS), address-matched, and coordinate derived data developed at DEP and EPA Region 1.

Data Sources

The primary sources of information for this datalayer include:

- Site-specific knowledge of BWP Compliance and Enforcement staff
- GPS field verification by BWP and/or DEP GIS staff
- Surveys, site plans and locus maps from DEP records

The attribute section of this document contains additional information regarding data sources utilized in the development of this datalayer.

PRODUCTION

Point Development Tool

To facilitate conversion of institutional knowledge and paper data to a digital format, the DEP GIS Program created the Point Development Tool (PDT), a customized application using ESRI's ArcView software (the PDT application is available as an extension to the MassGIS DataViewer). The PDT provides a standardized platform that guides users through the automation and documentation of geographically referenced point data. DEP technical staff used the PDT to locate facilities based on knowledge gained in the course of their professional activities. On screen digitizing using the PDT was the primary method of automation.

Basemap Scale

Using data in the "development coverage," the PDT navigates data developers to the general vicinity of a site. The PDT then displays the best digital base imagery available for that vicinity. The PDT uses MassGIS 1 meter (1:5,000) black and white digital orthophoto images (DOQ) as the default basemap. Where 1 meter 1:5,000 DOQs were not available, the PDT defaulted to 1 meter USGS (1:12,000) black and white digital orthophoto images or (1:25,000) USGS topographic quadrangle imagery respectively. When data development began, the only available digital

basemap imagery for much of Massachusetts was the MassGIS scanned USGS (1:25,000) topographic images. Therefore, the base scale of this datalayer is considered to be 1:25,000.

Other Methodologies
In the absence of staff with professional knowledge, facility files were checked for location information. Facility files maintained by the DEP contain a variety of types and quality of maps, including surveys, site plans and locus maps. DEP GIS and BWP Program staff reviewed this file information and identified the best manuscript maps and supplemental text information for locating sites. Locations were entered using the PDT.

Whenever possible, facility locations derived from GPS field verification were refined using field notes, hand sketched field maps, and the basemap imagery described above. Some facility locations were derived from existing DEP datalayers containing solid waste facilities and Tier Classified Chapter 21E Oil or Hazardous Material sites.

ATTRIBUTES

1. Attribute Data Structure
The point attribute table (.pat) for the DEP Major Facilities datalayer contains the following items:

General Site Information Items:

ITEM	*TYPE-WIDTH*	*DEFINITION*
FAC_ID	B – 4 / 7	Facility ID from Facility Master File (FMF) Database
FAC_NAME	C – 45 / 45	Facility Name from FMF Database
ADDRESS	C – 38 / 38	Facility Address from FMF Database
TOWN	C – 21 / 21	MassGIS town name
DEP-ID	I – 1 / 1	MassGIS DEP Region code
RTN	C – 9 / 9	DEP BWSC 21e Release Tracking Number (RTN)
HW_ID	C – 12 / 12	EPA RCRAINFO Hazardous Waste Generator ID
NPDES_ID	C – 15 / 15	National Pollution Discharge Elimination System ID

Standard PDT Data Documentation Items:

ITEM	*TYPE-WIDTH*	*DEFINITION*
L_TYPE	C - 16 / 16	Location type
L_METHOD	C - 6 / 6	Location method
SOURCE	C – 30 / 30	Source material
PDT_COMMENT	C – 40 / 40	Development comments

Major Activity Items:

ITEM	*TYPE-WIDTH*	*DEFINITION*
AIR	C - 1 / 1	Air Operating Permit
GWD	C – 1 / 1	Groundwater Discharge
HWR	C – 1 / 1	Hazardous Waste Recycler
LQG	C - 1 / 1	Large Quantity Generator
LQTU	C - 1 / 1	Large Quantity Toxic User
TSDF	C - 1 / 1	Treatment, Storage and/or Disposal Facility

2. Description of General Facility Information Items
General facility information attributes are populated using DEP's Facility Master File (FMF) Database.

h. FAC_ID
Facility ID from DEP's Facility Master File (FMF) Database. The FAC_ID is a unique identifier used in the FMF Database to identify facilities and their ownership**.**

i. FAC_NAME
Facility name from the FMF Database.

j. ADDRESS
The number and street address of the facility, as listed in the FMF Database.

k. TOWN
The standard MassGIS town name.

l. DEP-ID
A code corresponding to the DEP Region in which the facility is located. This field uses standard DEP Region codes:

DEP-ID	DEP REGION – Office location	ACRONYM
1	Western Region - Springfield	WERO
2	Central Region – Worcester	CERO
3	Northeast Region – Wilmington	NERO
4	Southeast Region – Lakeville	SERO

m. RTN

If a relationship between a BWP Facility and a BWSC Chapter 21e site was uncovered in the data development process, the RTN field will be populated. The Release Tracking Number (RTN), is a unique 7-digit site identifier assigned to reportable releases by the BWSC. This number is preceded by the digit 1, 2, 3, or 4 (e.g. 3-0001234) according to the DEP region in which the site is located (see: description of DEP-ID above).

n. HW_ID

EPA Hazardous Waste Generator ID from the RCRAINFO database. A unique identifier generated by RCRAINFO, EPA's database formerly known as the Resource Conservation and Recovery Information System (RCRIS).

o. NPDES_ID

If a relationship between a BWP Facility and a National Pollution Discharge Elimination System (NPDES) facility was discovered in the data development process, the NPDES_ID field will be populated. The National Pollution Discharge Elimination System ID is a unique identifier generated by EPA.

3. Description of Standard Data Documentation Items

a. L_TYPE

The location type (L_TYPE) field contains a spatial reference code, indicating what the point represents. Current location type codes include:

CODE	DEFINITION
CB	Approximate center of building footprint as shown on base image
CB2	Approximate center of a building footprint, NOT positive on building identified
CF	Approximate center of a facility having more than one building or structure
CS	Approximate center of site or area of known contamination
CT	Approximate center of individual tank or cluster of tanks (UST or AST)
EL	Estimated location, implies absence of footprint on base image
FD	Front Door or main entrance to facility
ST	Air emission stack

b. L_METHOD

The location method (L_METHOD) field contains an alphanumeric code which provides information on both the method used to locate the site and the estimated level of data quality.

The alpha portion of the code indicates the method of automation. Sites automated using the PDT have an alpha L_METHOD code of either "ORTH" or "TOPO". Location method codes containing "ORTH" indicate sites automated by on screen digitizing, using an orthophoto (1:5,000 or 1:12,000) image base. Location method codes containing "TOPO" indicate sites automated by on screen digitizing, using a USGS topographic (1:25,000) image base.

For PDT automated locations, the numeric portion of the L_METHOD code represents an "estimated confidence" in the quality of the point location. This value is assigned via an interactive dialog with the data developer at the time the time of automation.

L_METHOD Codes/Criteria for Facilities Automated Using the PDT:

CODE	CRITERIA
ORTH1 or **TOPO1**	Estimated to be +/-100-f t from L_TYPE
ORTH2 or **TOPO2**	Estimated to be100 – 500-ft from L_TYPE
ORTH3 or **TOPO3**	Estimated to be 500 – 1,000-ft from L_TYPE

Non-PDT location method codes such as "GPS," which indicate facilities located using

global positioning system (GPS) technology, also have numeric values indicating the general quality of the location.

L_METHOD Codes/Criteria for Facilities NOT Automated Using the PDT:

CODE	CRITERIA
GPS_1	GPS verified location, averaged from 100+ 3D differentially corrected (DGPS) positions and mapped +/-100-ft from the target feature.
GPS_2	GPS verified location, averaged from 50-100 3D DGPS positions, or location averaged from 100+ 3D DGPS positions and mapped between 100 – 500-ft. of the target feature.
GPS_3	3D GPS verified location not conforming to GPS_1 or GPS_2 criteria. (examples: location averaged from < 50 3D GPS position, or any 3D DGPS location mapped >500-ft from the target feature.)

Note: GPS location method criteria are based on the specifications and optimal accuracy capabilities of the Trimble Navigation GeoExplorer II GPS receiver.

c.) SOURCE

Codes contained in the SOURCE field indicate the type of source material used to locate the site.

Manuscript Map Type Codes:

LOCUS _<TYPE>	Locus map (TYPE codes include):	
	ATLAS	Road or street atlas based
	MGIS	MassGIS digital vector based
	ORTHO	Orthophoto based
	OTHER	Other locus types, ex. trail map
	USGS	USGS topographic quadrangle based
SURVEY_MAP	Survey grade map	
SITE_PLAN	Engineering site plan or map	
SKETCH_MAP	Hand sketched map (detailed or locus)	

Other Source Types Codes:

COORD_<SOURCE>	Coordinate data (see: DVD below for <SOURCE> codes)	
DVD _<SOURCE>	Digital vector data, NOT parcel data	
	SW	DEP Solid Waste Facilities Datalayer
	21e	Tier Classified 21e OHM Sites Datalayer
GPSDS	DEP GPS field data sheets	
SITE_VISIT	Field verified	
STAFF_KNOW	Located by DEP staff through knowledge gained in the course of their professional activities	
USGS	Interpolated from 1:25000 USGS topographic quadrangle	

d.) PDT_COMMENT

Development and quality assurance notations such as clarification of the feature located, historical Facility IDs and additional source information can be found in the PDT_COMMENT field.

4. Description of Major Activity Items

The Major Activity Items are Y/N fields indicating which of the more significant types of activities occur at a given facility. There are no specific if/then relationships between any of the Major Activity items.

a. AIR

A value of "Y" indicates the facility has an active air operating permit. This is a permit with specific restrictions on the type and amount of particulate or other matter emitted from the facility.

b. GWD

A value of "Y" indicates the facility has an active groundwater discharge permit. Please note we have attempted to locate the center of the facility rather than a specific discharge location. Refer to the L_TYPE to see what feature of the facility was mapped.

c. HWR

A value of "Y" indicates the facility engages in the recycling of hazardous waste.

d. LQG

A value of "Y" indicates the facility is a large quantity generator of one or more hazardous wastes.

e. LQTU
A value of "Y" indicates the facility is permitted as a large quantity toxics user and falls under the requirements of the Toxic Use Reduction Act (TURA). For a Toxics Use Reduction Act overview, visit the DEP TURA webpage at http://www.state.ma.us/dep/bwp/dhm/tura/turaover.htm.

f. TSDF
A value of "Y" indicates the facility engages in the treatment, storage and/or disposal of hazardous wastes.

RELATED TABLES

DEP Tier Classified Oil or Hazardous Material Sites
The BWSC maintains a file (wsc_all.zip) that can be downloaded from the DEP Web Site http://www.state.ma.us/dep/bwsc/sites/sdown.htm. This compressed (.zip) file includes a database (.dbf) file containing a record for all reportable releases tracked by the BWSC, and accompanying documentation (wsc_all.doc). BWSC updates the wsc_all.dbf on a regular schedule. Tabular data records in wsc_all.dbf can be related to the BWP Major Facilities datalayer by the Release Tracking Number (RTN) field.

General and technical questions regarding Chapter 21E, the MCP and waste site cleanup in Massachusetts should be directed to the DEP BWSC Helpline at (617) 338-2255 or (800) 426-0444. Considerable information on the waste site clean-up program is available on the DEP Web Site: http://www.state.ma.us/dep/bwsc. For more comprehensive coverage of oil and hazardous material sites in the Commonwealth, see the DEP Tier Classified Chapter 21e Sites datalayer.

Toxic Use Reduction Act Facilities
The BWP maintains information that can be downloaded from the DEP Web Site http://www.state.ma.us/dep/bwp/dhm/tura. Data extract files, such as those found in ext1997.zip can be related to the BWP Major Facilities datalayer by the FAC_ID field.

The DEP TURA Web Site contains links to other related Web Sites, including that of the Massachusetts Toxic Use Reduction Institute, http://www.turi.org/turadata; a site where TURA information is presented in a searchable format.

Environmental Protection Agency data
The Environmental Protection Agency (EPA) Envirofacts Web Site http://www.epa.gov/enviro presents information in a searchable format. Using the Facility Name, Address information or HW_ID, facility records can be queried on the EPA RCRIS web page http://www.epa.gov/enviro/html/rcris/rcris_query_java.html

MAINTENANCE

The DEP Major Facilities datalayer is maintained by the DEP Bureau of Waste Prevention. A regular update schedule has not been determined at this time. Updates may include improvements to mapped facility locations and/or the location of major facilities not included in the datalayer at this time. Updates may also include additional facility types and an altered database structure.

If you have questions regarding this datalayer, please contact the DEP Bureau of Waste Prevention at (617) 292-5694.

Municipal Zoning Datalayer
September 1998

OVERVIEW

The MassGIS zoning datalayer represents the boundaries of municipal zoning districts. Because zoning is established at the municipal level, there is no standard classification of zoning districts across the state. While districts in different communities may have similar or even identical names, their definitions are often quite different. Generalized codes have been added to make these data useful for regional display. A related table contains detailed information about the districts such as setbacks or text descriptions from each community's zoning bylaws.

Though originally processed by municipality, the zoning coverages are tiled by USGS quad because many of these data do not conform exactly to the MassGIS TOWN library index due to scale differences and boundary anomalies. Stored in the QUAD2 library in the **ZONING** layer, each coverage is named **ZN**. Zoning Overlay Districts are also stored in the QUAD2 library in the **ZONINGOV** layer. Overlay District coverages are named **OV.**

This data layer is under development, and many communities are not yet available.

Zoning district boundaries change frequently and we have no process in place to regularly update these coverages. These data should therefore be used for regional analysis only and not as official zoning maps. The municipality's own official zoning map and current copy of the by-law should be considered as the final word on zoning boundary questions or issues.

PRODUCTION

MassGIS received zoning coverages for many towns and cities in Eastern Massachusetts from the Central Transportation Planning Staff (CTPS) in 1993. Many of these coverages have since been updated by the Regional Planning Agencies (RPAs) and forwarded to MassGIS. Other communities not processed by CTPS were digitized by the RPAs from community-supplied zoning maps (at various scales). There are also a few communities (Salem, Beverly, Middleton and Gloucester) that were digitized by the Essex County Registry of Deeds.

MassGIS staff have digitized some additional communites where 1:5000-scale orthophotography was available. Zoning maps for these communites were scanned and georeferenced to the orthophotography. District boundaries aligned to or offset by a known distance from identifiable features were edited with reference to the orthophoto. In some cases, coverages from other sources also went through this editing process. Eventually, all coincident features and offsets in the zoning data layer will be referenced to the orthophoto, but given the utility of these data in regional and watershed planning we have decided not to wait for that extra processing to be complete before releasing the data.

ATTRIBUTES

MassGIS used a workstation version of ARC/INFO to combine data from different communities into a quad-tiled library (QUAD2) with a standard ARC/INFO Polygon Attribute Table (**ZN.PAT**). A related table (**ZN.BYLAWS**) contains dimensional requirements for zoning districts. This table is related by the **ZONECODE** field.

Items in **ZN.PAT**

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALT. NAME
TOWN-ID	3	3	I	-	-
TILE-NAME	3	3	C	-	-
ZONECODE	10	10	C	-	ZC
PRIMARYUSE	2	2	I	-	PU
LANDUSE	1	1	I	-	LU
LASTEDITED	8	8	I	-	-
SOURCE	7	7	C	-	-

ZONECODE is the district zoning code, a concatenation of town-id and abbreviation from the zoning maps. For example, a Residential A District in Weston (town-id 333) might be coded 333RES A or 333RA depending on what abbreviations the zoning map uses. If no abbreviations appear on the map then MassGIS assigned abbreviations to the districts. **PRIMARYUSE** is a code used to generalize zoning districts into a statewide, standardized format. **LANDUSE** is a more generalized version of this coding. These codes were developed to facilitate looking at these data across community boundaries.

Primary Use codes:
1 - Single Family Residential
2 - Multi-Family Residential
3 - Residential/Agricultural Mix
4 - Other Residential
5 - Neighborhood Business
6 - Highway Business
7 - Central Business District (CBD)
8 - Office Park
9 - Other Business
10 - General Industrial
11 - Light Industrial
12 - Medical Services
13 - Institutional
14 - Conservation/Recreation
15 - Mixed Use (no dominant use)
16 - Research Park
17 - Village Business
18 - General Business
19 - Other

Land Use codes:
1 - Residential
2 - Commercial
3 - Industrial
4 - Restricted (includes open space and protection overlay districts.)
5 – Other

LASTEDITED is the date of latest editing in numerical format (i.e. 19981002 for Oct. 2, 1998). **SOURCE** is the source of the data. If digitized from a community's zoning map, the source will be listed as "TOWN". For a more complete listing of sources of features and attributes by community, consult the source table **ZN.PSC** in the library's database directory.

Items in **ZN.BYLAWS**:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE
1	ZONECODE	10	10	C
11	CODE	7	7	C
18	ZONEDIST	40	40	C
58	MINLOTSIZE	8	11	F
66	MINFRONT	8	11	F
74	ML_TSVCS	8	11	F
82	ML_NSVCS	8	11	F
90	ML_1FAM	8	11	F
98	ML_2FAM	8	11	F
106	ML_XFAM	8	11	F
114	MLXBYUNIT	8	11	F
122	ML_SIT1	8	11	F
130	ML_SIT2	8	11	F
138	MF_TSVCS	8	11	F
146	MF_NSVCS	8	11	F
154	MF_1FAM	8	11	F
162	MF_2FAM	8	11	F
170	MF_XFAM	8	11	F
178	MF_SIT1	8	11	F
186	MF_SIT2	8	11	F
194	FAR_MAX	4	6	F
198	BLDCOV_MAX	4	6	F
202	LOTCOV_MAX	4	6	F
206	MAXHEIGHT	8	11	F
214	MAXSTORIES	4	4	F
218	SETBACK_F	8	11	F
226	SETBACK_SD	8	11	F
234	SETBACK_R	8	11	F
242	COMMENTS1	30	30	C
272	COMMENTS2	30	30	C
302	COMMENTS3	30	30	C

ZONECODE links this table to the **ZN.PAT**s in the library. **CODE** is the district's abbreviation from the zoning map. This field is also used to create annotation. **ZONEDIST** is a full descriptive name of the zoning district. **ML** is the minimum lot size and **MF** is minimum frontage. There are many ways that communities break down these requirements and some of the more common ones are represented by attributes in the tables. For example, a district may have a minimum frontage of 40 feet for single-family homes but only 35 feet for two-family and multi-family units. In this instance **MF_1FAM** = 40, **MF_2FAM** and **MF_XFAM** = 35. **MLXBYUNIT** is for cases when lot size is specified as per number of housing units. For any other situation, one can use the **ML_SIT1** or

ML_SIT2 fields and describe SIT1 in **COMMENTS1** and SIT2 in **COMMENTS2**. **SETBACK**s (front, side and rear), **FAR**s (floor area ratios), maximum heights (**MAXHEIGHT**) and number of stories (**MAXSTORIES**), building coverages (**BLDCOV_MAX**) and lot coverages (**LOTCOV_MAX**) also are in this table.

There is an annotation subclass (ANNO.CODE) which can be used to display the zoning district abbreviations on a map. Annotation will be updated along with coverage attributes.

OVERLAY DISTRICTS

Another library layer called **ZONINGOV** contains overlay districts that appear on the zoning map or are described in the by-law. These data are stored in the QUAD2 library and the coverages are named **OV**. The **OV.PAT** classifies overlay districts by type.

Items in **OV.PAT**:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE
1	AREA	4	12	F
5	PERIMETER	4	12	F
9	OVERLAYS#	4	5	B
13	OVERLAYS-ID	4	5	B
17	POLY-ID	5	5	I
22	FL	7	7	C
29	AE	7	7	C
36	HD	7	7	C
43	AQ	7	7	C
50	HT	7	7	C
57	I	7	7	C
64	WF	7	7	C
71	VG	7	7	C
78	HY	7	7	C
85	WP	7	7	C
92	WC	7	7	C
99	X	7	7	C

Descriptions of items:

FL	Floodplain	
AE	Adult Entertainment	
HD	Historic District	
AQ	Aquifer Protection	
HT	Height Restriction Zone	
I	Institutional Overlay	
WF	Waterfront District**VG**	Village District
HY	Highway District	
WP	Water Protection	
WC	Wireless Communication Area	
X	Other	

In order to make each overlay district code unique, a town-id is concatenated onto the beginning of each overlay code. Thus a flood plain overlay in town 27 would have its FL = 27FL. An overlay in the same town that doesn't fit into the above set of general desriptions would have X = 27X. The .pat is set up this way to allow for a polygon to be in multiple overlay districts simultaneously without using region features and to allow lookup to a table containing detailed description of each overlay district by town.

A table of overlay districts and detail on their requirements will be accessed by relates to the overlay .pat as follows:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC
1	OVDIST	7	7	C	-
8	DESC	30	30	C	-
38	REGS	60	60	C	-
98	CITATION	60	60	C	-

Example:

Record	OVDIST	DESC	REGS	CITATION
1	77FL	FLOOD PLAIN	NO DUMPING OR NEW CONSTRUCTION	
2	77AQ	AQUIFER PROTECTION DIST	MAXIMUM WELL DEPTH 50 FEET	
3	304HD1	HISTORIC PRES. DIST A	HISTORICALLY APPROPRIATE SIDING ON OLD BLDGS	
4	304FL	FLOOD PLAIN	NO SOIL REMOVAL OR NEW CONSTR.	

MAINTENANCE

MassGIS maintains this data layer. See http://www.state.ma.us/mgis/st_zon.htm for the most current status.

Outstanding Resource Waters Datalayer
March 1997

OVERVIEW

This datalayer delineates those areas afforded Outstanding Resource Waters classification under the Massachusetts Surface Water Quality Standards of 1995. According to 314 CMR 4.00: "Certain waters shall be designated for protection under this provision in 314 CMR 4.06(3) including Public Water Supplies (314 CMR 4.06(1)(d)1.). These waters constitute an outstanding resource as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values. The quality of these waters shall be protected and maintained." (March 1, 1995). This datalayer is stored as a single statewide coverage, **ORW**, in the STATE library.

MANUSCRIPT

The original source materials for this datalayer correspond to the MassGIS drainage subbasins and Areas of Critical Environmental Concern (ACEC) datalayers. Additional water supply watershed information was gathered from overlaying existing data onto USGS 1:25,000 quads and delineating additional watersheds. Other data was collected by buffering the existing MassGIS community boundaries and 1:25,000 hydrography datalayers.

METHODOLOGY

The existing MassGIS drainage subbasin datalayers were plotted on Mylar at 1:25,000 scale with the surface water withdrawal points from the MassGIS public water supplies datalayer. The basins of the surface water supplies were identified and if necessary additional drainage basins were delineated from the intake points of public water supplies. From these basins all upstream basins were coded as contributing to a surface public water supply. These basins were compared against the Massachusetts Surface Water Quality Standards of 1995 to determine which basins were designated as containing Outstanding Resource Waters (ORW). Additional areas added included ACECs, drainage basins of protected scenic rivers, protected wetlands areas and areas that contribute to other states' surface water supplies. This information was extracted from the component datalayers and appended into a single ORW datalayer.

ATTRIBUTES

In order to differentiate between ORW areas protected because of public drinking water supplies and other areas, the attribute **ORW** was added and coded as follows:

ORW	ORW Description
1	ORW contributing area of a public surface water supply
2	Other ORW area (ACEC, protected stream, etc.)

EDITING

The entire datalayer was check plotted by MA DEP region and quality checked by MA DEP Wetlands Conservancy Program staff.

MAINTENANCE

The DEP GIS Program maintains this data layer.

Ground Water Discharge Points Datalayer
March 1997

OVERVIEW

The Ground Water Discharge Points were compiled by the Department of Environmental Protection (DEP) Division of Water Pollution Control (DWPC) Ground Water (GW) Section. The datalayer contains permitted discharges of sanitary sewage in excess of 10,000 gallons per day (gpd), discharges of non-contact cooling water, discharges from coin operated laundromats, carwashes and treatment systems designed to remediate contaminated groundwaters. Information was collected from the Permit Application Files in the Boston Office. The coverage consists of 200 points, representing approximately 85% of the total number of discharge points. The data layer is stored as a single statewide coverage, **GWP**, in the STATE library.

As stated in 314 CMR 5.00, the Division will control the discharge of pollutants to the ground waters of the Commonwealth to assure that these waters are protected for their highest potential use.

MANUSCRIPT

Data were originally constructed from a Lotus Worksheet maintained by DEP/DWPC/GW. Collection of point locations began in 1989 and is ongoing. Points were first marked on USGS quadrangle sheets and then digitized.

METHODOLOGY

Once all point locations were verified by the project engineer or by a GIS staff site visit, points were digitized from the USGS quadrangles into Arc/INFO. Quadscale checkplots were made and then visually compared to the quads.

ATTRIBUTES

This data layer has a .PAT with the following items:

NUMA - unique permit number assigned to the site by DEP.

STAT - The status / type of discharge.
- 1 = Sanitary Discharge
- 2 = Industrial Discharge
- 3 = Reclamation (Remediation)
- 5 = Car Wash
- 6 = Laundromat

REGION - The DEP Region where the discharge is located.
- N = Northeast
- S = Southeast
- C = Central
- W = Western

MAINTENANCE

The DEP Division of Water Pollution Control is maintaining this datalayer. Updates are planned annually.

FEMA Q3 Flood Datalayer
July 1997

OVERVIEW

These data represent a subset of the data available on the paper Flood Insurance Rate Maps (FIRM) as provided by the Federal Emergency Management Agency (FEMA). The Q3 flood data were developed to support floodplain management and planning activities but do not replace the official paper FIRMs. These data are not suitable for engineering applications or site work nor can the data be used to determine absolute delineations of flood boundaries. Instead the data should be used to portray zones of uncertainty and possible risks associated with flooding. The Q3 flood data is tiled by the **QUAD** library, as layer **Q3FLOOD** and coverage name **Q3**.

METHODOLOGY

FEMA created the Q3 Flood data by scanning current FIRM paper maps and vectorizing the data. Though the scales of the map sheets vary and the original paper FIRMs contain no horizontal control, the data do have horizontal control consistent with 1:24,000 maps. This was accomplished by fitting the flood data to a USGS quadrangle. Edgematching, overlaps and underlaps in data and other problems were not corrected during the conversion process. The data were received from FEMA as Arc/INFO export files that were processed by MassGIS and incorporated into the data library. While FEMA intends to perform biannual review of data, the user is advised to confirm that the digital data does indeed represent the most current FIRMs.

ATTRIBUTES

The attributes for the datalayer have been minimally modified by the addition of the item TILE-NAME and COUNTY. All other items are as supplied by FEMA. While the metadata files provide some descriptions of the items and their values, the FEMA-generated metafiles contain detailed descriptions of both. The FEMA metadata for this layer are found in hardcopy at MassGIS or in softcopy as ASCII files in the QUAD library under the database/Q3META subdirectory. The polygon attribute table (.PAT) for Q3 flood data has the following structure:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	AREA	8	18	F	5	
9	PERIMETER	8	18	F	5	
17	Q3#	4	5	B	-	
21	Q3-ID	4	5	B	-	
25	TILE-NAME	8	8	C	-	identifier for librarian
33	COUNTY	10	10	C	-	county name
43	FIPS	5	5	C	-	5 digit state and county FIPS code
48	COMMUNITY	4	4	C	-	county,city or community responsible for floodplain mgmt
52	FIRM_PANEL	11	11	C	-	code to identify portion of community covered/not covered by FIRM panel
63	QUAD	8	8	C	-	FEMA id to identify USGS 7.5 minute quad
71	ZONE	5	5	C	-	flood hazard zone designation
76	FLOODWAY	5	5	C	-	channel, river or watercourse reserved for flood discharge
81	COBRA	9	9	C	-	id whether in or out of coastal barrier resources system area
90	SFHA	3	3	C	-	in/out of flood zone designation
93	SYMBOL	4	5	B	-	FEMA polygon shade symbol for graphic output
97	PANEL_TYP	4	4	C	-	type of FIRM panel represented
**	REDEFINED ITEMS **					
43	ST-FIPS	2	2	C	-	state FIPS code
45	CO-FIPS	3	3	C	-	county FIPS code
43	STATE	2	2	C	-	state FIPS code
54	PCOMM	4	4	C	-	FIRM community/county identifier
58	PANEL	5	5	C	-	FIRM panel number and suffix
63	LAT	2	2	C	-	origin latitude of 7.5 minute quadrangle
65	LONG	3	3	C	-	origin longitude of 7.5 quadrangle
69	QUAD_UNIT	2	2	C	-	index number to 7.5 quadrangle

MAINTENANCE

The datalayer is managed by MassGIS but no effort has been or will be made to correct data discrepancies. FEMA does not recommend the alteration of the data. As a final reminder, these data ***do not*** replace the paper FIRMs which remain the official documents.

Flood Insurance Rate Map Zones V and AO Datalayer
April 1997

OVERVIEW

The Federal Emergency Management Agency designated velocity and over-wash zones from the Flood Insurance Rate Maps were compiled by the Resource Mapping Project staff at the University of Massachusetts, Amherst for the Massachusetts Coastal Zone Management (MCZM) Program. The data are stored as a single statewide coverage named **FIRMAOV**.

MANUSCRIPT

Paper FEMA Flood Insurance Rate Maps at a variety of scales.

METHODOLOGY

A polygon coverage was built by digitizing delineations interpreted on paper 1:24,000 USGS Topographic maps. The delineations were transferred to the USGS base from the FEMA Flood Insurance Rate Maps utilizing a Zoom Transfer Scope. The shoreline used in this coverage is from the MassGIS 1:25,000 source. The automation of this data was conducted in May, 1993. Minor changes to the delineations have been made and published by FEMA.

ATTRIBUTES

The data layer has a .PAT with the following items:

Item Name	Width	Output	Type	Comments
POLYID	4	5	B	1 = Land 2 = Water 3 = Non MA Land 4 = Velocity Zone 5 = Over-wash Zone
FPNAME	8	8	C	"V" or "AO" designation.

MAINTENANCE

Currently there are no plans to update this data by MCZM.

Insect Infestation Datalayers
May 1998

OVERVIEW

The DEM insect infestation data layers indicate the areas that have been defoliated by insects, diseases, or natural weather events on a year to year basis. Data is currently available from 1961 to the present. When the project is complete data will be available from 1934 through 1946 (with no defoliation in 1942 and 1943) and from 1961 to present. There is a separate data layer for each year, each named bugs<YY>.

The DEM, Bureau of Forestry, Forest Health Program uses this information to follow various forest stress factors that might be causing a decline of the forest resource.

PRODUCTION

Each year the entire state is flown by trained observers at an altitude of approximately 2000 feet above the forest canopy. All areas that look abnormal are sketched on to USGS topographic maps. These areas are then visited on the ground to document the cause of the problem. All polygons are labeled as to the cause of the problem and digitized into GIS.

From 1962 to the present 1:24,000 or 1:25,000 scale maps are used. Prior to 1961 the 1:62,500 scale maps were used.

ATTRIBUTES

For 1996 and earlier:

COMMON-NAME	Common Name of the Insect
ACRES	Approximate area defoliated
TOWN-ID	MassGIS town code
TOWN	Town Name
FIPS-STCO	Federal Information Processing Standard State/County Code (FIPS ID)

In 1997, attribute table was changed, at the request of the US Forest Service, to conform to other states.

Attributes for 1997:

DMG_TYPE1	Primary type of damage
DMG_TYPE2	Second type of damage (where applicable)
DMG_TYPE3	Third type of damage (where applicable)
SEVERITY1	Severity of primary type of damage
SEVERITY2	Severity of second type of damage (where applicable)
SEVERITY3	Severity of third type of damage (where applicable)
PATTERN1	Pattern of primary type of damage
PATTERN2	Pattern of second type of damage (where applicable)
PATTERN3	Pattern of third type of damage (where applicable)
DCA1	Damage causing agent for primary type of damage
DCA2	Damage causing agent for second type of damage (where applicable)
DCA3	Damage causing agent for third type of damage (where applicable)
FOREST_TYPE	Predominant type of forest
HOST1	Host species affected
HOST2	Second host species affected (where applicable)
HOST3	Third host species affected (where applicable)
ACRES	Approximate area affected
FIPS-STCO	FIPS ID
TOWN	Town name
TOWN-ID	MassGIS town code

Codes for new fields:

DMG_TYPE	1 - Defoliation 2 - Discoloration 3 - Dieback 4 - Branch Breakage 5 - Main stem broken/uprooted 6 - Mortality
SEVERITY	1 - Light (up to 50%)

	2 - Mod-Heavy (over 50%)
PATTERN	1 - Host species more than 50% in polygon and contiguous 2 - Host species more than 50% in polygon, damage patchy 3 - Host species less than 50% in polygon, damage scattered
DCA	5-digit code for several hundred possibilities; use DCA1.LUT, DCA2.LUT, and DCA3.LUT examples: 12089 gypsy month*Lymantria dispar* 14004 hemlock wooly adelgid*Adelges tsugae* 22042 beech bark disease*Nectria coccinea* 50013 wind/tornado 70007 logging damage
FOREST_TYPE	4-digit code for scores of possibilities; see documentation for specifics. examples: 0030 White pine 0040 White pine/hemlock 0410 White pine/northern red oak/white ash
HOST	3-digit code for scores of possibilities; use HOST1.LUT, HOST2.LUT, and HOST3.LUT examples: 043 Atlantic white cedar 129 Eastern white pine 833 Northern red oak

MAINTENANCE

Each summer as the aerial survey is completed the data will be added as a new data layer. DEM is maintaining this datalayer.

DEP DWM Monitoring Stations Datalayer
December 1997

OVERVIEW

The DEP Division of Watershed Management (DWM) Monitoring Stations datalayer represents points on rivers, ponds and lakes where water-quality samples were taken by DWM staff during 1995 and 1996. DWM and the MA Department of Environmental Protection GIS Group compiled the datalayer. Most station locations were chosen to support the environmental monitoring phase of the Massachusetts Watershed Initiative. New stations will be added as additional watersheds complete this phase and the related monitoring data pass the DWM quality control and quality-assurance checks. Monitoring results are stored in related INFO tables described under ATTRIBUTES (below). Data maintained in these tables is reported by the DWM in assessment reports. These are available upon request by contacting the Division of Watershed Management at 508-792-7470. The coverage is stored as a statewide layer named **DWM_STATIONS**. The coverage name is **DWM_STAT**.

MANUSCRIPT

The data layer was created using field descriptions recorded by the staff at the time the samples were taken. These transcriptions were then transferred to 1:24000 or 1:25000 USGS topographic quadrangles. Station identification codes are assigned by DWM and used in the Water Quality Data Database. Tables from the Water Quality Database can be linked with this data layer using the UNIQUE_ID item. Stations in approximately 12 major basins are included in this data layer.

PRODUCTION

Locations recorded on 1:24000 and 1:25000 USGS topographic maps were transferred to a point coverage using on-screen digitizing and registered images of the USGS topographic maps. Watershed teams were consulted to ensure the accuracy of this transferal.

ATTRIBUTES

This data layer has a .PAT with the following items:

UNIQUE_ID	code corresponding to DWM database
LONG	longitude
LAT	latitude

RELATED TABLES

Data generated from surveys conducted by DWM staff are maintained in the four tables listed below.

DWM_STAT.STAID

Station location and identification information. This table contains fields that describe the station. This table is related to the data coverage by use of the UNIQUE_ID field. The UNIQUE_ID is also used to relate to the FIELD table. This table contains one record for each station location. Fields in the STAID Table:

UNIQUE_ID	Unique identifier assigned individual monitoring stations used to relate to point coverage and FIELD table
STATUS	Status of data at time of publication
TYPE	Station type (W=Water Column, D=Discharge Pipe - Not an instream station)
SARIS	Stream and River Identification System code
PALIS	Pond and Lake Identification System Code
WBNAME	Name of water body where the station is located
MILEPT	River mile upstream from mouth (Mouth is defined as river mile 0.0). Code "-9" are stations at the confluence of rivers
STAID	Station ID assigned and used by Watershed Team
DESCRIPTOR	Detailed description of station location

DWM_STAT.FIELD

Field record of sampling surveys. This table records the date and time that samples were taken in the field as well as information for tracking the sample and quality control and assurance. This table is related to the STAID table by the UNIQUE_ID field (which in turn is linked to the data

layer). It is possible to relate the FIELD table directly to the data layer using the UNIQUE_ID field; however, it is not recommended. This table contains one record for each visit to a station during a sampling survey. Most stations are visited more than once. Fields in the Field table:

UNIQUE_ID	nique identifier assigned individual monitoring stations used to relate to FIELD table
OWMID	Identifying code assigned to individual samples. Used to link to both the LAB and HYDRO tables
STATUS	Status of data at time of publication
QAQC	Identifies field QAQC samples (BLANK = Distilled Water Blank, Split samples are indicated by populating this field with the OWMID of the paired sample)
SDEPTH	Depth at which discrete samples are collected for laboratory analysis ONLY. This field is only populated where sampling apparatus allowing collection of samples below the surface has been used
DATE	Date of sample collection
TIME	Time of sample collection in 24-hour format
WDO	Azide modification of Winkler method on grab sample
DTEMP	Temperature, in degrees Celsius, in field using a hand-held thermometer
METER	Meter used for in situ determinations of one or more of the following: depth, temperature, salinity, dissolved oxygen, specific conductivity, and pH. (YSI=Yellow Springs Instruments, HLB=Hydrolab Surveyor II without data logging). Note: Measurements using a Hydrolab Surveyor 3 multiprobe instrument with data logger are maintained in the HYDRO table.
MDEPTH	Depth in meters (m) measured by instrument indicated in the field METER
MTEMP	Temperature in degrees Celsius (°C) measured by instrument indicated in the field METER
MSALINITY	alinity in parts per thousand (ppt) measured by instrument indicated in the field METER
MDO	Dissolved Oxygen in milligrams per liter (mg/l measured by instrument indicated in the field METER.
MSPECOND	pecific Conductivity (?mhos/cm) measured by instrument indicated in the field METER
MPH	pH in standard pH units (SU) measured by instrument indicated in the field METER

LAB

Results of laboratory analysis of discrete samples collected by DWM staff during a sampling survey and analyzed at the Wall Experiment Station. The LAB table is related to the FIELD table using the OWMID field. This table contains one record for each set of sampling bottles collected at a station and sent to the lab for analysis. Codes used in populating data into the fields below are:

Results reported less than detection limits are entered as negative values. (i.e. a result of <0.02 is entered as -0.02)

-7 = Interference
-8 = Missing data (i.e. broken bottle, lost sample, censored data)
-9 = Result was reported as a literal zero "0". Null value indicates no data.

OWMID	Identifying code assigned to individual samples. Used to relate to the FIELD table
STATUS	Status of data at time of publication
PH	pH (standard pH units)
ALK	Alkalinity (mg/l)
HARD	Hardness (mg/l)
SPECCOND	Specific Conductivity (?mhos)
CHLORIDE	Chlorides (mg/l)
SSOLIDS	Suspended solids (mg/l)
TSOLIDS	Total solids (mg/l)
TURB	Turbidity (NTU)
TKN	Total Kjeldahl Nitrogen (mg/l)
AMMONIA	Ammonia Nitrogen (mg/l)
NITRATE	Nitrate Nitrogen (mg/l)
TPHOS	Total Phosphorus (mg/l)
EXTBLAB	Yes/No. Indicates if bacteria results are from a lab other than the Wall Experiment Station
TCOLIFORM	Total coliform bacteria (cfu/100 ml)
FECAL	Fecal coliform bacteria (cfu/100 ml)
FECALSTREP	Fecal Streptococci (cfu/100ml)

HYDRO

Results of measurements made in situ using a Hydrolab Surveyor 3 multiprobe instrument with data logger. The HYDRO table is linked to the FIELD table using the OWMID field. This table contains one record for each visit to a station during a survey.

OWMID	Identifying code assigned to individual samples. Used to link to the table
STATUS	Status of data at time of publication
TIME	Time of measurement (Hours:minutes:seconds)
TEMP	Temperature in degrees Celsius (°C)
PH	pH in standard pH units (SU)
SPCOND	Specific conductivity in microsiemens (?S/cm)
DOSAT	Percent dissolved oxygen saturation (%)
DO	Dissolved oxygen (mg/l)
DEPTH	Depth in meters (m)
TURB	Turbidity (NTU)
DATE	Date of measurement

MAINTENANCE

DEP GIS Group and DWM are maintaining this data layer.

USGS Data-Collection Stations Datalayer
November 1998

OVERVIEW

The US Geological Survey (USGS) maintains data-collection stations throughout Massachusetts. This statewide datalayer, **DCSITE98**, represents active and discontinued stations at which USGS collects or had previously collected streamflow data. Though maintained by USGS, the stations are funded by various sources. The points represent four types of data-collection stations. Type 1 stations are streamflow-gaging stations, where data are or have been collected continuously for numerous uses. Type 2 stations are peak-flow partial-record stations, where data are collected only when streamflows are high relative to normal conditions. Data from type 2 stations are used to compute peak-flow frequency statistics, such as the 100-year recurrence interval flood. Type 3 stations are low-flow partial-record or miscellaneous-measurements stations, where data are collected primarily for estimating low-flow statistics, such as the 7-day, 10-year low flow, but data may also be collected at these stations for other purposes specific to individual hydrologic studies. Type 4 stations are those that have been operated both as a type 2 and a type 3 station, either at the same or at different times. Of the 725 stations included in this data layer, data were collected at only 85 streamflow-gaging stations during 1998. All other stations were inactive, but streamflow statistics for all the stations are available.

MANUSCRIPT

Data-collection station locations and attributes were derived from the National Water Information System database of the USGS.

METHODOLOGY

USGS staff created an ASCII file of latitude, longitude and attribute data pulled from the data base. This file was then used to generate a point coverage. The coordinates were originally measured from USGS 1:25,000 and 1:24,000 topographic quadrangles with an accuracy to one second.

ATTRIBUTES

This data layer has a .PAT (polygon attribute table) with the following items:

STATION#	Data-collection station identifier
LONG	Longitude of station
LAT	Latitude of station
TYPE	Type of data-collection station, where streamflow records are or have been collected: 1 = streamflow-gaging station where continuous streamflow records are or have been collected 2 = peak-flow partial-record station 3 = low-flow partial-record or miscellaneous-measurement station 4 = peak- and low-flow partial-record station

MAINTENANCE

MassGIS is maintaining this layer. Updates will be made as information is made available from USGS.

Stream-Gaging Stations Datalayer
May 1996

OVERVIEW

The US Geological Survey (USGS) maintains stream-gaging stations in Massachusetts. This datalayer, **GAGES94**, represents the stations managed by USGS in 1994. Though maintained by USGS, these seventy one stations are funded by various sources. The points in this datalayer are fairly stable from year to year, though new gages are added and others removed as project work requires. This datalayer is stored as a single point coverage in the State library.

MANUSCRIPT

Gaging station locations and attributes were derived from the data report "Water Resources Data, Massachusetts and Rhode Island Water Year 1994", Gadoury, R.A., Socolow, R.S., Girouard, G.G., Ramsbey, L.S., U.S. Geological Survey. The reference for this data report is MA-RI-94-1, 1995.

METHODOLOGY

USGS staff created an ascii file of latitude, longitude and attribute data pulled from the data report. This file was then used to generate a point coverage. The coordinates were originally measured from USGS 1:25,000 and 1:24,000 topographic quadrangles with an accuracy to one second.

ATTRIBUTES

This data layer has a .PAT with the following items:

STATION#	gaging station identifier
LONG	longitude of gaging station
LAT	latitude of gaging station
FUND	source of funding for gaging station maintenance
CODE	funding source code

MAINTENANCE

MassGIS is maintaining this datalayer. Updates will be made as information is made available from USGS.

Water Quality Monitoring Stations
October 1999

OVERVIEW

Massachusetts Coastal Zone Management (MCZM), within the Executive Office of Environmental Affairs (EOEA), has compiled a water quality sampling GIS coverage for the Parker River/Essex Bay Area of Critical Environmental Concern (ACEC) project. The purpose of the project was to develop a regional picture of water quality information. The coverage has an associated database including information on who is collecting the samples and the parameters being measured for each site. The focus area for this project includes the areas between Salisbury and Gloucester.

METHOLODOGY

CZM gathered existing information from agencies and organizations doing water quality sampling in this area, most of which was not in a GIS format. These agencies included: Department of Environmental Protection (DEP) Division of Marine Fisheries (DMF); Department of Fisheries, Wildlife & Environmental Law Enforcement (DFWELE) Division of Watershed Management (DWM); Ipswich River Watershed Association (IRWA); Massachusetts Audubon Society (MAS); Merrimack Valley Planning Commission (MVPC); Parker River Clean Watershed Association (PRCWA); and Woods Hole/Marine Biological Lab. Data was then compiled in ArcView as Shapefiles and joined with each agency's database. This process varied for each agency depending on their existing data format, described as follows:

DEP DMF: Data points were downloaded from MassGIS as an ArcInfo Export file and imported to ArcView. The associated database was compiled as a spreadsheet and joined with the shapefile.

DFWELE DWM, MVPC, Woods Hole/Marine Biological Lab: Data points and attributes were compiled by each agency and sent as an ArcView shapefile.

IRWA, MAS, PRCWA: Data points were identified by each agency on USGS 7.5-minute quadrangle maps and were then on-screen digitized using scanned quad images from MassGIS. The associated database was created from existing reports and reports that are in the process of being completed by agency staff.

ATTRIBUTES

This data layer has a **.PAT** with the following items:

ID	ID NUMBER FROM THE VARIOUS AGENCIES
STATN_CODE	STATION ID ASSIGNED BY WATERSHED TEAM
STAT_CODE	STATION CODE INCLUDING ORGANIZATION
STAT_NAME	STATION NAME AS GIVEN BY THE ORGANIZATION MONITORING
HOW_OFTEN	HOW OFTEN SAMPLES WERE TAKEN
PARAMETERS	PARAMETERS BEING SAMPLED
STREAM	NAME OF WATER WHERE STATION IS LOCATED
TOWN	NAME OF TOWN WHERE STATION IS LOCATED
METHOD	HOW PARAMETERS WERE BEING TESTED
REPORT	REPORT FROM WHICH THIS INFORMATION WAS RECEIVED
SOURCE	HOW STATION WAS LOCATED ON THE MAP
FECALCOLI	DETERMINES IF FECAL COLIFORM WAS SAMPLED FOR
DATE_START	DATE SAMPLE COLLECTION BEGAN
DATE_STOP	DATE SAMPLE COLLECTION ENDED
CONTACT	ORGANIZATION RESPONSIBLE FOR SAMPLING SITE

MAINTENANCE

All project work has been archived at MCZM offices. For further information, please contact Data Manager, Diane Carle, (617) 626-1222, MCZM, Boston, MA

Shellfish Sampling Stations Datalayer
October 2000

OVERVIEW

The Shellfish Sampling Station datalayer was compiled by the Department of Fisheries, Wildlife and Environmental Law Enforcement's (DFWELE) Division of Marine Fisheries (DMF). Approximately twenty-seven hundred station locations in Massachusetts have been designated by DMF's Shellfish Project, and are stored as a single point coverage in the NE library named **SHLFSHST**. These point locations range from sites for collecting water quality and shellfish samples, to marine biotoxin (PSP) samples to locations of marinas and mooring fields. Each station is associated to a designated shellfish growing area (see separate datalayer description Designated Shellfish Growing Area Datalayer). This coverage reflects classification station locations as of July 1, 2000.

METHODOLOGY

The station locations were defined by DMF shellfish project biologists. Compilation base maps covering the entire coast and islands were plotted at 1:12,000 using hydrography from 1:24,000 USGS DLG; 1:100,000 USGS DLG; and 1:25,000 USGS Topographic maps, all modified and enhanced by MassGIS. Other information such as town boundaries, the territorial waters line and roads were plotted on these base maps for reference. Shellfish project biologists compiled station locations on to the base maps, and these points were then digitized by DMF GIS personnel. Check plots were created and station locations QA/QC'd by the biologists.

PRODUCTION

Separate 11 x 17 color plots were produced for each growing area based on the mapextent of the area and its sampling stations. Station points needing to be moved or added are compiled on these plots and automated by DMF GIS staff. A new 11 x 17 is produced and kept on file until another station change occurs.

ATTRIBUTES

This datalayer has a **.PAT** file with the following attribute associated with each point:

SHLFSHST-ID	Station ID number
GRW_AREACD	Designated shellfish growing area code. Each classification station is associated to one designated shellfish growing area.
CL_AREANM	Classification area name. Each classification station is also associated to one classification area (which is a sub-area of a designated shellfish growing area).
STAT_TYPE	Station type. In all cases this is CLASSIFICATION (Locations where water and shellfish samples are collected on a routine basis. These samples are tested for fecal coliform content, the results of which are used for classifying areas for harvest of shellfish for human consumption)
STAT_NAME	Station name
STAT_DATE	Data the station was established
LOCATION	Location description

The SHLFSHST-ID links to several tables in an Oracle relational database. Information in the database is extensive and covers the station name and type, a brief location description, and sample data collected at the location. In addition, each of these point locations is associated to a designated shellfish growing area and the growing area's classification (management) areas. A separate GIS datalayer has been created to maintain the areas. See the Designated Shellfish Growing Area datalayer description.

MAINTENANCE

The MA Division of Marine Fisheries and MassGIS are maintaining this datalayer. For further information about this coverage and other data associated with these stations, contact the MA Division of Marine Fisheries Shellfish Project at either Pocasset (508-563-1779) or Newburyport (978-465-3553).

Coastline (1:25,000) Datalayer
April 1992

OVERVIEW

MassGIS has modified the USGS 1:24,000 Hydrography Digital Line Graph (DLG) quadrangle files to produce the Massachusetts coastline. The coast is maintained as 84 separate quadrangles of coast, each identified by **CS<QUAD-ID>**. Please refer to the list of *USGS 1:25,000 quadrangles* for quadrangle names and numbers.

PRODUCTION

MassGIS reformatted the DLG files into Arc/INFO coverages and projected them into the Mass. State Plane Coordinate system, NAD27. The coastline was then extracted from the files and edited. Polygon topology was also created for each quadrangle. The coverages have since been projected into the Massachusetts State Plane Coordinate System, NAD83 meters.

ATTRIBUTES

Item **TYPE** in CS<QUAD-ID>.AAT is coded:

TYPE	DEFINITION
0	Quadrangle boundary
1	Coastline
2	State boundary
9	Non-geographic feature

NOTE: Due to the complexity of the coverages, some polygons were split. The lines used to split polygons are coded **9** and represent no geographic feature.

Item **TYPE** in CS<QUAD-ID>.PAT is also coded:

TYPE	DEFINITION
1	Land
2	Water
3	Land; Represents areas outside of Massachusetts

EDITING

Checkplots were produced and compared to the paper 1:25,000 quads. Some digital quads were not available from the USGS at the time of production. Those quads were manually digitized. All quads were snapped to adjacent quads to ensure a continuous coastline.

To best serve the most users, the coastline was determined to end at the first dam from the mouth of a river. In the instances where no dam was evident on the DLGs, the coastal coverage was ended 4 quadrangles in from the shore. This technique was used for the Merrimack, Neponset and Taunton Rivers.

Coastline (1:5,000) Datalayer
March 1997

OVERVIEW

The 1:5000 scale coastline datalayer represents a shoreline generated from soft breaklines created from Digital Terrain Model (DTM) data points collected during the production of the 1:5,000 Black and White Digital Orthophoto images. The single layer, named **COAST5K**, is currently in development.

Breaklines coded "soft" for coastal areas were extracted from the original "hard" and "soft" breakline coverages tiled by orthoquad. The new "soft" breakline coverages were appended to produce one coverage. This coverage was manually edited using the orthophoto images as a background.

ATTRIBUTES

In addition to the standard items, the .AAT contains the item **OQ-ID**, which links the arcs to their original orthophoto index tile.

MAINTENANCE

MassGIS is maintaining this datalayer. Areas currently available include Cape Cod and the Boston metropolitan region from Nahant to Cohasset. As new DTM point data are available, soft breaklines generated for coastal regions will be incorporated into this layer.

Fish Traps (Weirs) Datalayer
August 1999

OVERVIEW

The Fish Traps (weirs) datalayer contains the point locations of fish trap permit holders' traps. These permit holders are licensed by the town in which the traps reside as well as by the MA Division of Marine Fisheries (DMF). Not all locations are active, and attributes in the PAT file reflect which trap was active each year from 1990 through 1998 based on catch reports submitted monthly by the permit holders. This datalayer is stored as a single statewide coverage named **FISH-TRP**.

METHODOLOGY

Points were generated using lat/long coordinates from the fish trap permit holder applications. Each application details the proposed trap location including lat/long. New points are added to the datalayer as new locations are approved by DMF. Currently there are 64 points in the datalayer.

ATTRIBUTES

The FISH-TRP.PAT (point attribute table) contains the following items:

TRAPNO	DMF Trap Number	3	3	I
ID	DMF Permit ID Number	6	6	C
ACT90	Active in 1990 (Y or N)	1	1	C
ACT91	Active in 1991 (Y or N)	1	1	C
ACT92	Active in 1992 (Y or N)	1	1	C
ACT93	Active in 1993 (Y or N)	1	1	C
ACT94	Active in 1994 (Y or N)	1	1	C
ACT95	Active in 1995 (Y or N)	1	1	C
ACT96	Active in 1996 (Y or N)	1	1	C
ACT97	Active in 1997 (Y or N)	1	1	C
ACT98	Active in 1998 (Y or N)	1	1	C

MAINTENANCE

MassGIS is maintaining this datalayer.

Anadromous Fish Datalayer
March 1997

OVERVIEW

The Department of Fisheries, Wildlife and Environmental Law Enforcement (DFWELE) GIS Program working in conjunction with biologists from the MA Division of Marine Fisheries and the MA Division of Fisheries and Wildlife compiled and automated a point coverage of anadromous fish data. The data include all known coastal anadromous fish runs spawning habitat and runs for three major inland rivers - the Nashua, the Concord and the Shawsheen. For the purposes of this database, a run, as defined by DFWELE GIS, is specific to a species and a named stream.

Note, this data layer should not be considered definitive in determining the presence or absence of fish runs, spawning habitat, barriers or fishways. It is the DFWELE GIS Program's best current representation of these features. Neither should this layer or its derived maps be used for making site specific regulatory decisions. Rather, its appropriate use is for education and regional planning. This is a transition coverage. When MASSGIS completes its "hydro centerline" project, producing a complete hydro network for the Commonwealth, inherently linear features such as fish runs and many of the spawning habitat features will be represented as such.

The Anadromous Fish datalayer is stored as a single coverage, **ANADFISH,** in the New England **(NE)** Library.

METHODOLOGY

During interviews with Division biologists the data points were compiled onto 1:25,000 basemaps using the best available hydrographic data. "Heads-up" digitizing was used to automate the data points. Paper forms were completed with information regarding locations of barriers, fishways, beginning and ending of runs and spawning habitat. The information from these forms was used to populate the associated look up tables (.riv,.run,.bar).

ATTRIBUTES

The .pat file contains references to (interview) form number, (form) page number and point id number. Form and point id number were combined to form a unique ID. The references to form and page number were designed to facilitate reference back to the appropriate forms during the data checking process.

There are three lookup tables: one to identify the river (.riv); one to identify the barriers and fishways (.bar); and one to identify the runs and spawning habitats (.run). There is a one-to-many relationship between the data points and the beginning/ending points of runs and spawning habitats. This will require the use of the NEXT command for INFO only queries or Cursors in ARCEDIT or ARCPLOT. Please see http://www.state.ma.us/dfwele/gisprog/gis_toc.htm for sample code.

NOTE: Shapefiles cannot handle info item names longer than 10 characters. If you are working with shape files see the MASSGIS provided file, INFO2SHP.DBF for the translation table.

Items in the **ANADFISH.PAT:**

FORM	# of form on which original data written down
PAGE	page # of form
PTID	# on form and on markup map which identifies a feature
COMMENTS	comment on feature
ANADID	concatenation of FORM and PTID to produce a unique coverage ID which is used to relate points in the coverage to records in the .luts

Note: underlined items have code definitions included below.

Items in the **ANADFISH.RIV:**

FORM	# of form on which original data written down
RIVPAGE	page # on form on which data for particular river begins
RIVPTID	# on form and on markup map which identifies the beginning of a river
CLASS	# defines where river flows into {(1) bay or ocean; (2) into 1; (3) into 2}
NAME	name of river
ALIAS	other name of river
ISCOMMENT	yes or no, simplifies reselect
COMMENTS	
ANADRIVID	concatenation of FORM and RIVPTID to produce a unique id which is used to relate to the .pat or .luts

Table relate note:
To identify a river with any point, relate ANADID from the .PAT to ANADRIVID in the ANADFISH.RIV

Items in the **ANADFISH.RUN**:

FORM	# of form on which original data written down
RIVPAGE	page # on form on which data for particular river associated with a run begins
RIVPTID	# on form and on markup map which identifies a feature
RUNPAGE	page # on form on which data for particular EVENTTYPE begins
BEGPTID	# on form and PTID on markup map which marks beginning of EVENTTYPE
ENDPTID	# on form and PTID on markup map which marks ending of EVENTTYPE
SPECIES	species of fish (separate records maintained for each species, even if run is the same)
EVENTTYPE	Run or Spawning
STATUS1	existing or historical
STATUS2	common or rare
STATUS3	confirmed or unconfirmed
ISCOMMENT	yes or no, comments are rare, useful for finding them.
COMMENTS	
ANADRIVID	concatenation of FORM and RIVPTID to produce a unique coverage id which is used to relate to the .pat or luts
ANADBGID	concatenation of FORM and BEGPTID to produce a unique coverage id which is used torelate to the .pat to identify the beginning of an EVENTTYPE
ANADEDID	concatentation of FORM and ENDPTID to produce a unique coverage id which is used to relate to the .pat to identify the end of an EVENTTYPE

Table relate note:
To identify the beginning of an EVENTTYPE, relate ANADID from the .PAT to ANADBGID in the ANADFISH.RUN
To identify the end of an EVENTTYPE, relate ANADID from the .PAT to ANADEDID in the ANADFISH.RUN

Items in the **ANADFISH.BAR**

FORM	# of form on which original data written down
RIVPAGE	page # on form on which data for particular river containing barrier begins
RIVPTID	# on form and on markup map which identifies a feature
BARPAGE	page # on form on which data for a particular barrier is found
BARPTID	# on form and on markup map which identifies a barrier
DAM	yes or no, simplifies reselect
FISHWAY	yes or no, simplifies reselect
TYPEFISHWAY	what kind of fishway
EFFECTFISHWAY	{(1) all species pass; (2) some species pass; (3) no species pass}
NATURALBAR	yes or no, simplifies reselect
TYPENATBAR	what kind of natural barrier
OTHERBAR	yes or no, simplifies reselect
TYPEOTHERBAR	what kind of man made barrier
ISCOMMENT	yes or no, simplifies reselect
COMMENTS	
ISDIAGRAM	yes or no, simplifies reselect
ANADRIVID	concatenation of FORM and RIVPTID to produce a unique coverage id which is used to relate to the .pat or luts to identify a river
ANADBARID	concatenation of FORM and BARPTID to produce a unique coverage id which is used to relate to the .pat to identify the barrier location

Table relate note:
To identify a barrier or fishway, relate ANADID from the .PAT to ANADBARID in ANADFISH.BAR

Coding for categorical items in the lookup tables is as follows:

LOOKUP TABLE	ITEM	DEFINITIONS
ANADFISH.RIV	CLASS	1 - Empties into ocean or bay 2 - Empties into 1 3 - Empties into 2
ANADFISH.RUN	EVENTTYPE	LOC - Local concentration RUN - Run SPN - Spawning habitat
	SPECIES	ALW - Alewife ASH - American Shad ASM - Atlantic Salmon ATS - Atlantic Sturgeon BBH - Blueback Herring LMP - Lamprey RBS - Rainbow Smelt SNS - Shortnosed Sturgeon WPR - White Perch
	STATUS1	E - existing H - historic
	STATUS2	C - common R - rare
	STATUS3	C - confirmed U - unconfirmed
ANADFISH.BAR	EFFECTFISHWAY	1 - All species pass 2 - Some species pass 3 - No species pass
	TYPEFISHWAY	DN - Denil EL - Elevator FL - Fishladder LO - Locks used by fish ST - Steps TM - Temporary UN - Unknown VS - Vertical slot WB - Wooden boards WD - Weir pool and denil WF - Weir pool and Fishladder WP - Weir pool WS - Weir pool and steps
	TYPENATBAR	NF - Natural falls BL - Boulders DRB - Dry river bed SB - Sand bar BB - Barrier beach BD - Bog dam RAPID - Rapid VG- Thick growth vegetation GE - Ground elevation LF - Low flow
	TYPEOTHERBAR	SW - Sluiceway TG - Tidegate CUL - Culvert DI - Ditch PP - Power plant SCREEN

Designated Shellfish Growing Areas Datalayer
October 2000

OVERVIEW

The Designated Shellfish Growing Area (DSGA) datalayer was compiled by the Department of Fisheries, Wildlife and Environmental Law Enforcement's (DFWELE) Division of Marine Fisheries (DMF). Three hundred and three growing areas in Massachusetts have been designated by DMF's Shellfish Project, and are stored as a single polygon coverage named **DSGA** stored in the NE library.

A designated shellfish growing area is an area of potential shellfish habitat, and all three hundred and three DSGA's make up the territorial waters (tidal zone out to the territorial line) of the Commonwealth. Growing areas are managed with respect to shellfish harvest for direct human consumption, and comprise at least one or more **classification areas**. The classification areas are the management units, and range from being **approved** to **prohibited** (six different classification types in all) with respect to shellfish harvest. For example, one growing area may be composed of four classification areas, all of which are managed separately (have a classification type the same or different from the rest in the growing area). This coverage reflects classification areas as of July 1, 2000.

METHODOLOGY

The growing areas and their classification areas were defined by DMF shellfish project biologists. Compilation base maps covering the entire coast and islands were plotted at 1:12,000 using hydrography from 1:24,000 USGS DLG; 1:100,000 USGS DLG; and 1:25,000 USGS Topographic maps, all modified and enhanced by MassGIS. In addition, town boundaries, the territorial waters line and roads were plotted on these base maps. Shellfish project biologists compiled area boundaries onto the base maps, and these boundaries were then digitized or constructed using existing hydrography, town or territorial sea lines by DMF GIS personnel. Check plots were created and boundaries QA/QC'd by the biologists.

PRODUCTION

Separate 11 x 17 color plots are produced for each growing area based on the mapextent of the area and its sampling stations. Classification area lines which need to be added, moved or deleted are compiled on these plots and automated by DMF GIS staff. A new 11 x 17 is produced and kept on file until another area change occurs.

ATTRIBUTES

The **.PAT** file (polygon attribute table) has the following attributes associated with each polygon:

GRW_AREAID	ID associated to each growing area
CL_DESC_ID	Unique ID for each class area
GRW_AREACD	Code name for growing area. For example: N2 is the GRW_AREACD for the Merrimack River
GRW_AREA_NM	Meaningful name for growing area (For example: Merrimack River for N2)
CL_AREANM	Classification area name (Code format similar to GRW_AREACD. Starts with GRW_AREACD and is appended by a '.' and a number making it unique within the growing area. For example: N2 has a classification area in it called N2.0
CL_TYPE	Classification type or how classification area is classified with respect to shellfish harvest for direct human consumption. There are six classification types which are listed below.
CL_STATUS	Classification status or whether the area is OPEN or CLOSED to shellfish harvest for direct human consumption.
CL_BEGINDT	Date classification area was classified.

CLASSIFICATION TYPES:

Note symbol numbers have been included because the Division of Marine Fisheries Shellfish Project has asked that the same shadeset symbols are used for each classification type so that maps are plotted consistently.

APPROVED	Open for harvest of shellfish for direct human consumption subject to local rules and state regulations. (SHADESET SWPI - SYMBOL 3)
CONDITIONALLY APPROVED	During the time area is approved, it is open for harvest of shellfish for direct human consumption subject to local rules and state regulations. (SHADESET SWPI -SYMBOL 502)
CONDITIONALLY RESTRICTED	During the time area is restricted, it is only open for the harvest of shellfish with depuration subject to local rules and state regulations. (SHADESET SWPI - SYMBOL 265)

RESTRICTED	Open for harvest of shellfish with depuration subject to local rules and state regulations or for the relay of shellfish. (SHADESET SWPI - SYMBOL 381)
MANAGEMENT CLOSURE	Closed for harvest of shellfish. Not enough testing has been done in the area to determine whether it is fit for shellfish harvest or not. (SHADESET SWPI - SYMBOL 34)
PROHIBITED	Closed for harvest of shellfish. (SHADESET SWPI - SYMBOL 2)

The two ID's (GRW_AREAID and CL_DESC_ID) link to ID's in several different tables in an Oracle relational database. Information in the database is extensive and covers the area names and classification types, legal boundary descriptions, date of classification, rainfall data and acreage figures. Historical information about each area is maintained, beginning January 1, 1995. In addition, area information is also associated with water quality and marine biotoxin sampling data collected by shellfish project biologists, used to manage the areas. A separate GIS datalayer called SHLFSHST has been created to maintain the sampling points; see the Shellfish Sampling Station Datalayer description for details.

This datalayer has an **.AAT** file with the following attributes associated with each arc (same as 1:25K hydrography, since coastline was constructed using this datalayer):

MINOR_TOT
SOURCE
COAST
MINOR_NUM

See the 1:25,000 Hydrography Datalayer description for codes.

The attribute **SOURCE** has also been used to code added arcs (non-hydrography arcs) as part of lines between adjacent growing areas and classification areas as well as overall polygon closure lines. The codes are as follows:

SOURCE = C	Indicates an arc which separates two classification areas within the same growing area.
SOURCE = G	Indicates an arc which separates two growing areas.

These codes can be useful when plotting, as the arcs can be identified and plotted differently.

MAINTENANCE

The Division of Marine Fisheries and MassGIS are maintaining this datalayer.

MA DMF Lobster Harvest Zones Datalayer
August 1999

OVERVIEW

This datalayer consists of 25 distinct "statistical reporting areas" covering a large portion of the Gulf of Maine and south, including the territorial waters of the Commonwealth of Massachusetts. Fourteen of the areas compose the territorial waters, while the other 11 match those of the National Marine Fisheries Service areas for offshore bodies of water bordering the Commonwealth's territorial areas, including George's Bank. These areas are used mainly on maps for fishermen to report their landings (including lobster harvest), as well as for producing plots in various Massachusetts Division of Marine Fisheries (DMF) annual publications showing landings per area. The data distributed by MassGIS includes statistics for lobster harvest zones only; 1997 is the only year data currently available. The datalayer is stored as a single coverage in the NE library, named **LOB-HARV**.

METHODOLOGY

A polygon coverage was created from several different sources. State boundaries from Maine to Connecticut at 1:25,000 were combined to form a 'New England' land coverage for basic reference and coastline. Existing territorial lines were combined as well as bathymetric and latitude-longitude lines to complete the polygons.

ATTRIBUTES

The **LOB-HARV.PAT** (polygon attribute table) contains the following items:

AREA_ID	3	3	I		Statistical Area ID or Number
POUNDS97	12	12	N	2	Lobsters harvested in pounds for specific year

MAINTENANCE

MassGIS is maintaining this layer. Updates will be made as information is made available from USGS.

Tidal Restrictions Datalayer
October 1999

OVERVIEW

The Massachusetts Coastal Zone Management (MCZM), within the Executive Office of Environmental Affairs (EOEA), has compiled a tidal crossing inventory and assessment GIS coverage for the Parker River/Essex Bay ACEC project. The purpose of the project was to develop a regional picture of current and potential restoration sites based on current tidal restrictions. The focus area for this project includes the areas between Salisbury and Salem. The data is stored as a single statewide layer, named **TIDALRST**.

METHODOLOGY

CZM first reviewed existing data from the Tidal Crossing Inventory and Assessment, Full Report: Upper North Shore, Massachusetts, which was prepared for the Eight Towns and the Bay Committee, December 19, 1996 by Parker River Clean Water Association. The digital data was compiled in ArcView by on-screen digitizing the points from the original Tidal Crossing Inventory using 1:5,000 half-meter resolution black and white orthophotos as a base coverage and joining the points with a database file of attributes

ATTRIBUTES

This data layer has a .PAT with the following items:

ID	Numerical ID of tidal crossing location
SITE_NAME	Unique town site name
ID_NUM	Unique state site name
TOWN	Town the site is located in
LOC_DESC	Physical description of area
WATER_BODY	Water body that is restricted
STREET	Street causing restriction
RESTRICTIO	Restriction phase
UPSTM_TIDA	Upstream tide height
DNSTM_TIDA	Downstream tide height
CI_COND_BR	Condition of the bridge
CI_COND_CU	Condition of the culvert
CI_COND_RD	Condition of the road
CULVERT_TY	Type of culvert
CULVRT_DIM	Dimensions of opening
UPSTR_CH_W	Upstream channel width at crossing
DNSTR_CH_W	Downstream channel width at crossing
LENGTH_CRO	Length of crossing
CROSS_WIDT	Crossing width in middle
RD_MATERIA	Road surface material
RD_WIDTH	Road surface width in middle

MAINTENANCE

All project work has been archived at MCZM offices. For further information, please contact Data Manager, Diane Carle, (617) 626-1222, MCZM, Boston, MA

Bathymetry for the Gulf of Maine Datalayer
December 1999

OVERVIEW

This datalayer represents seafloor topography for the Gulf of Maine, extending from the Bay of Fundy south of New Brunswick to the Continental Shelf southeast of Nantucket. The linework in this layer came from an ArcInfo bathymetric contour coverage available through the U.S. Geological Survey's Coastal and Marine Geologic and Environmental Research program, part of its Woods Hole Field Center. MassGIS assembled the data into a polygon coverage stored in the NE library, named **BATHYMGM**.

MANUSCRIPT

The USGS collected data from available sources on the Web and from CD-ROM products. The data included digital sounding data, digitized contour line data and previously gridded products from a variety of sources. Specifically, seven datasets were incorporated to produce a final 15 second grid product:

- NOAA Hydrographic Survey Data and NGDC Marine Trackline Geophysics Data - hydrographic surveys completed between 1930 and 1965, and from survey data acquired digitally on NOS survey vessels since 1965. The data is extremely dense in many regions (greater than 0.5 km resolution), but there are large gaps in the coverage due to surveys currently in non-digital form.
- Naval Oceanographic Office DBDB-V gridded bathymetry - crucial coverage in the interior of the Gulf and in Canadian waters, constructed from a variety of public and classified source data.
- Supplemental Datasets from Bedford Institute of Oceanography and Brookhaven National Laboratory - filled gaps in the interior of the Gulf between the NOSDB data and the DBDB-V data as well as providing coverage of the Scotian Shelf and gaps on the eastern flank of Georges Bank.
- NOAA Medium resolution digital Shoreline and DMA World Vector Shoreline - 1:80,000 US shoreline created by the Strategic Environmental Assessments Division of NOAA's Office of Ocean Resources, Conservation and Assessment. The DMA's World Vector Shoreline (WVS) is suitable for scales close to 1:250,000.
- Defense Mapping Agency ETOPO5 Digital relief of the Surface of the Earth - generated from a digital data base of land and seafloor elevations on a 5-minute latitude/longitude grid. The original source of the data in the ocean areas in ETOPO5 is from the U.S. Naval Oceanographic Office.
- GEBCO General Bathymetric Chart of the Oceans - Digitized bathymetry for the World Ocean at a scale varying from 1:10 million to 1:500,000 depending on data density. GEBCO bathymetry is available from the British Oceanographic Center on behalf of the International Hydrographic Organization.
- USGS North American 30 arc-second Digial Elevation Model (DEM), used for land values. MassGIS removed this land data; the BATHYMGM layer contains topography for offshore areas only.

Bathymetry contour lines were then generated at the following intervals, in meters below sea level, from the 15 second grid: -4000, -3000, -2000, -1000, -500, -400, -300, -280, -260, -240, -220, -200, -180, -160,-140, -120, -100, -90, -80, -70, -60, -50, -40, -30, -20, -15, -10, -5

PRODUCTION

MassGIS processed the bathymetry linework coverage to remove dangles and intersection errors and to create polygon topology. With Arc Macro Language (AML), each polygon was coded for a range of depth below sea level in meters, based on the values of the lines' CONTOUR item. Additionally, the mainland areas were "sealed off" to create an inland polygon coded with the range "Above -5." Because there was no zero contour or coastline in the original USGS dataset, this inland polygon

represents the shallowest of sea floor topography. When displaying this layer it is important to draw land features atop the bathymetry; the coastline included in land feature will serve as the zero contour and the area just offshore will appear as the -5 to 0 range.

ATTRIBUTES

The **.PAT** (polygon attribute table) has the following attributes associated with each polygon:

HIGH	4	5	B	The highest (closest to surface) depth, in meters
LOW	4	5	B	The lowest (farthest from surface) depth, in meters
DEPTHRANGE	14	14	C	The range of values, from the HIGH value to LOW
DEPTHCODE	2	2	I	A numeric code based on the DEPTHRANGE value. See following table:

DEPTHRANGE	DEPTHCODE
Above -5	1
-5 TO -10	2
-10 TO -15	3
-15 TO -20	4
-20 TO -30	5
-30 TO -40	6
-40 TO -50	7
-50 TO -60	8
-60 TO -70	9
-70 TO -80	10
-80 TO -90	11
-90 TO -100	12
-100 TO -120	13
-120 TO -140	14
-140 TO -160	15
-160 TO -180	16
-180 TO -200	17
-200 TO -220	18
-220 TO -240	19
-240 TO -260	20
-260 TO -280	21
-280 TO -300	22
-300 TO -400	23
-400 TO -500	24
-500 TO -1000	25
-1000 TO -2000	26
-2000 TO -3000	27
-3000 TO -4000	28
Below -4000	29

The **.AAT** (arc attribute table) has the following attributes:

CONTOUR	4	5	B	Depth below sea level, in meters

This layer also contains three levels of annotation, subclass NAME, for some offshore features.

MAINTENANCE

MassGIS is maintaining this datalayer. More information on this and related datasets may be found online at http://oracle.er.usgs.gov/GoMaine/bathy/. A more generalized and less extensive offshore bathymetry coverage developed by Mass. Coastal Zone Management, BTHOS250, is also available.

Offshore Bathymetry (1:250,000) Datalayer
December 1999

OVERVIEW

This datalayer represents bathymetry data - seafloor topography - for ocean waters off the coast of Massachusetts. The layer was created by EOEA Coastal Zone Management analysts for graphic display purposes only and is general in nature; it should not be used for navigation. Polygons were delineated from a 1:250,000 USGS regional map. Ocean depth measurements are in meters. The dataset is stored as a single coverage in the NE library named BTHOS250.

ATTRIBUTES

The datalayer's polygon attribute table (.PAT) has the following items:

DEPTH_NOS	8	12	F	0	Code number for depth range (see table below)
DEPTHRANGE	14	14	C	-	Text field indicating depth below sea level, in meters

DEPTH_NOS	**DEPTHRANGE**
1	Above -15m
2	-15m to -25m
3	-25m to -40m
4	-40m to -90m
5	-90m to -200m
6	Below -200m

This layer also contains two levels of annotation, subclass NAME, for some offshore features.

MAINTENANCE

The layer is being maintained by MassGIS. For more detailed offshore bathymetry see the description for the Bathymetry for the Gulf of Maine datalayer.

The Massachusetts Coastal Zone Datalayer
April 1997

OVERVIEW

The Coastal Zone data layer was compiled by the Massachusetts Bays Program. The data are stored as a single statewide coverage named **CSTZONE**.

MANUSCRIPT

The Massachusetts Coastal Zone Management Plan Volume II of 2, Chapter 5: Massachusetts Coastal Regions and An Atlas of Resources. The maps in this document were derived from reduced reproductions of USGS Topographic Maps.

METHODOLOGY

An arc and polygon coverage were built by "screen digitizing" the boundary. Reference material included road and stream data from MassGIS as well as other un-documented sources. The shoreline used in this coverage is from the MassGIS 1:100,000 source.

ATTRIBUTES

The data layer has an .AAT and .PAT with the following items:

The .AAT:

Item Name	Width	Output	Type	Comments
BOUNDARY	4	5	C	Numeric code matching feature type
FEATURE	16	16	C	Definition of boundary type including (inland, shoreline, federal, state)

The .PAT:

Item Name	Width	Output	Type	Comments
CZ-TYPE	2	2	I	Numeric code matching feature type
FEATURE	16	16	C	Identifies lands and waters within the Coastal Zone

MAINTENANCE

The Massachusetts Coastal Zone Management (MCZM) Program maintains the data.

Coastal Barrier Resource Units Datalayer
April 1997

OVERVIEW

The U.S. Fish and Wildlife Service designated coastal barrier resource units data layer was compiled by the Resource Mapping Project staff at the University of Massachusetts, Amherst for the Massachusetts Coastal Zone Management (MCZM) Program. The data are stored as a single statewide coverage named CBRS. The designations show barrier beaches and the associated aquatic habitat.

MANUSCRIPT

Interpreted 1:25,000 paper USGS Topographic Maps from the U.S. Fish and Wildlife Service.

METHODOLOGY

A polygon coverage was built by digitizing interpreted feature boundaries not including the shoreline. The shoreline used in this coverage is from the MassGIS 1:25,000 source. The automation of this data was conducted in May, 1993. Minor changes to the delineations have recently been made and published in the Federal Register. Updated delineations will be available when the U.S. Fish and Wildlife Service provides revised documents.

ATTRIBUTES

The data layer has an .AAT and .PAT with the following items:

The .AAT (Arc Attribute Table):

Item Name	Width	Output	Type	Comments
BOUNDARY	4	5	B	Numeric code matching feature type.
FEATURE	16	16	C	Identifies inland shoreline or marine boundary.

The .PAT (Polygon Attribute Table):

Item Name	**Width**	**Output**	**Type**	**Comments**
POLYID	4	5	B	1 = Land 2 = Water 3 = Non MA Land 11 to 96 Numeric code to identify unique features. <11 to 96>999 = Aquatic component to designation.
CBRSNAME	8	8	C	U.S.F.W.S. alpha-numeric code for each unit, or a “Marine” label for marinecomponents.

MAINTENANCE

The Massachusetts Coastal Zone Management Program maintains the data.

State Designated Barrier Beaches Datalayer
April 1997

OVERVIEW

The state barrier beach data layer was compiled by the Resource Mapping Project staff at the University of Massachusetts, Amherst for the Massachusetts Coastal Zone Management (MCZM) Program. The data are stored as a single statewide coverage named **BARRIERB**.

MANUSCRIPT

Interpreted paper USGS Topographic Maps.

METHODOLOGY

A polygon coverage was built by digitizing interpreted feature boundaries not including the shoreline. The shoreline used in this coverage is from the MassGIS 1:25,000 source.

ATTRIBUTES

The data layer has a .AAT (Arc Attribute Table) with the following items:

Item Name	Width	Output	Type	Comments
BBPOLYID	4	5	B	Arbitary numeric code to identify unique features.
BBNAME	8	8	C	State designated alpha-numeric code for each barrier beach unit.

MAINTENANCE

MCZM maintains the data.

Stellwagen Bank National Marine Sanctuary Datalayer
April 1997

OVERVIEW

The Stellwagen Bank National Marine Sanctuary data layer was compiled by the Massachusetts Bays Program. The data are stored as a single coverage named **STELLBNK** in the STATE library.

MANUSCRIPT

A table of precise position locations taken from the Federal Register.

METHODOLOGY

A polygon coverage was generated from a series of point locations entered from the keyboard.

ATTRIBUTES

The data layer has a .PAT with the following items:

Item Name	Width	Output	Type	Comments
Boundary	4	5	B	Numeric code matching feature type
Feature	16	16	C	Federal/State boundary definition

MAINTENANCE

The Massachusetts Coastal Zone Management (MCZM) Program maintains the data.

Federal & State Marine Sanctuaries Datalayer
October 1996

OVERVIEW

This datalayer represents the boundaries of several federal and state marine sanctuaries located off the coast of Massachusetts. It was developed by the Enquad Harbor Studies Department of the Massachusetts Water Resources Authority. The layer and coverage are both named **SANCT**, stored in the NE library.

ATTRIBUTES

The **SANCT.PAT** (polygon attribute table) contains the following items:

TYPE Type of feature (Mainland = 2, Island = 3, Sanctuary = 4)
NAME Name of sanctuary

MAINTENANCE

MCZM maintains the data.

Salt Marsh Restoration Sites Datalayer
October 2000

OVERVIEW

Massachusetts Coastal Zone Management (MCZM), within the Executive Office of Environmental Affairs (EOEA), has compiled a salt marsh restoration GIS coverage for the Parker River / Essex Bay Area of Critical Environmental Concern (ACEC) project. The purpose of the project was to develop a regional picture of past, current, and potential restoration sites along with supporting information to help future restoration planning. The focus area for this project includes the salt marsh between Salisbury and Gloucester. The layer is stored as single coverage in the STATE library, named **SMRESTOR**.

METHODOLOGY

This datalayer was compiled by meeting with staff from the Massachusetts Audubon Society and Northeast Massachusetts Mosquito Control and Wetlands Management. Restoration sites and Open Marsh Water Management (OMWM) were identified by having staff from these two organizations identify point locations of restoration sites using USGS base maps. The database was created in ArcView and then joined with the associated points.

ATTRIBUTES

This data layer has a .PAT (point attribute table) with the following items:

ID	4-letter watershed abbreviation and consecutive number
PROJ_NAME	(Project name) Common or organizational name given to restoration sites
TOWN	Municipality of restoration site
WATERBODY	Closest USGS feature that restoration site drains into
SITE_OWNER	Choice of: public; private; nonprofit
STATUS	Choice of: complete; potential; active; inactive; monitored; permitted only
MONITORING	Name of organization in charge of restoration pre- or post-monitoring
FUND_STATUS	(Funding status) Choice of: funded; unfunded; partially funded for restoration work
COST_EST	(Cost estimate) Choice of: unknown; <10K; 10-100K; >100K
PARTNERS	Other project participants besides the main contact
CONTACT	Primary organizer of restoration project
ACRE_RANGE	Range of acreage. Choice of: ranges being <1; 1-5; 5-10; 10-25; 25-50; 50-100; >100
PROJ_DESC	(Project description) Description of restoration project
PROJ_TYPE	(Project type) Choice of: restoration or mosquito control OMWM

MAINTENANCE

All project work has been archived at MCZM offices. For further information, please contact Data Manager, Diane Carle, (617) 626-1222, MCZM, Boston, MA, 02114-2119.

Nautical Datalayer Datalayer
August 1997

OVERVIEW

The nautical datalayer was developed by Photo Science Inc. of Gaithersburg, Maryland for the Massachusetts Coastal Zone Management (MCZM) Program. The datalayer contains 25 feature layers from NOAA nautical charts. Only features represented by line work were extracted. Aids to navigation and bathymetry were not compiled. The data are stored as a single coverage named **NAUTICAL** in the Northeast (NE) library.

MANUSCRIPT

Thirty-three individual digital NOAA nautical charts ranging in scale from 1:5,000 to 1:80,000.

METHODOLOGY

TIFF imagery was imported to ARC/INFO with the IMAGEGRID command. Magenta, Gray, and Black features were extracted with ARCSCAN. Custom editing was conducted to capture or remove features after the ARCSCAN session. Vector editing was conducted using imagery in the background. Topology was generated for each chart with the BUILD LINE option. All charts were APPENDED to a single statewide coverage. No "rubber sheeting" of data along chart borders was conducted. Features were split on borders of different scale charts, and lower resolution data were removed. Annotation is included.

ATTRIBUTES

The data layer has an .AAT (Arc Attribute Table) with the following items:

Item Name	Width	Output	Type
CODE	4	5	B
DESCRIPTION	35	35	C

FEATURES INCLUDED:

0 – Unidentified
1 - Channel Boundary
2 - Traffic Lane
3 - COLREGS Demarcation Zone
4 – Cable
5 – Pipeline
6 - Sewer Line
7 - Three Nautical Mile
8 - Territorial Sea
9 - Anchorage Area
10 - Pilot Boarding Area
11 - Pipeline Area
12 - Precautionary Area
13 - Prohibited Area
14 - Cable Area
15 - Channel Separation Zone
16 - Disposal
17 - Unexploded Ordinance Area
18 - Fish Trap Area
19 - Safety Zone
20 - Spoil Area
21 - Area to be Avoided
22 - Anchorage berths
23 - Tunnel
24 - National Wildlife Refuge Area

MAINTENANCE

Currently MCZM has no plans to update this datalayer.

Datalayers from the 1990 U.S. Census of Population and Housing
December 1995

OVERVIEW

The US Bureau of the Census developed and now distributes the Topologically Integrated Geographic Encoding and Referencing System (TIGER) extract data sets as part of the 1990 Decennial Census. These files are available nationwide and serve as a geographic framework for Census summary statistical and demographic data. EOEA has obtained these files and has reprocessed them into Arc/INFO format and the Massachusetts State Plane Coordinate System to match the existing MassGIS database.

The Census Bureau developed the "TIGER/Line" geographical database to support its census enumeration and publication programs starting with the 1990 Decennial Census. Linework contained in these files includes the boundary features that the Bureau uses in preparing its data tabulations, including roads, streams, and political boundaries. Much of this linework is comparable to the 1:100,000 scale Digital Line Graphs (DLGs) produced by the U.S. Geological Survey, and in fact DLGs of roads and streams were the source of much of the linework compiled outside of metropolitan areas. Unlike DLGs, the TIGER/Line data includes feature names and, in metropolitan areas, ranges of street addresses. Street name and address attributes facilitate the process of "address-matching" or "geocoding" -- linking addresses with geographic coordinates in a GIS.

The TIGER network of lines forms the boundaries of "census block" polygons, the smallest units used by the Census Bureau in tabulating its data. Census blocks are typically the size of city blocks: in fact, they often *are* city blocks, but they can be bounded not only by streets but also by other linear geographic features in the TIGER files including streams and political boundaries. Each of these polygons is assigned a census block number in the TIGER file that is used to reference tabular data published by the Census Bureau.

The tabular data files ("matrices") published by the Census Bureau, *not* the TIGER files themselves, contain the demographic summaries produced as a result of the 1990 Census. However, in the reprocessing of TIGER files for use at MassGIS, a few selected data attributes were extracted from these matrices and incorporated into the MassGIS Census datalayers.

WHAT MASSGIS PROVIDES

As federal digital data products, Census data including TIGER files and matrices are available for purchase directly from the Census Bureau in Washington, D.C. Data are also available to the public at 41 Federal and Census Depository Libraries in Massachusetts, including many university libraries and the Boston Public Library.

MassGIS has extracted and reprocessed data from the original TIGER files for use in its Arc/INFO Geographic Information System. The reprocessed Census datalayer has been converted into the Massachusetts State Plane Coordinate system; to minimize processing requirements, the data have been extracted into two datalayers, each with individual town coverages. The *Census Block/TIGER* datalayer includes the complete set of TIGER linework. The Census block coverages have been prepared for Arc/INFO address matching and have a few demographic data items appended from a variety of Census Bureau publications. The *Census Block Group* datalayer contains only the block group boundaries, so has less spatial detail than the Census Block layer, but has much more demographic data from the Census Bureau's STF-1a and STF-3 publications.

The MassGIS Census data may be convenient for use in an Arc/INFO GIS environment, in projects requiring data in the Massachusetts State Plane Coordinate system, or in applications which make

use of the specific set of Census Bureau demographic data appended to the MassGIS coverages. In other cases it may be equally effective to obtain the original TIGER files directly from the Census Bureau.

CONSIDERATIONS WHEN USING TIGER DATA

The development of a nationwide, standard 1:100,000 scale geographic data set for the 1990 Census has been hailed as the "backbone" of a federal geographic data infrastructure. The TIGER files are a unique resource, containing a wealth of geographic data attributes unavailable in earlier data sets such as the 1:100,000 scale Digital Line Graphs published by the U.S. Geological Survey. The link between the TIGER files and Census Bureau data -- and potentially with data to be published by other federal agencies -- makes TIGER data an attractive option for GIS users. Furthermore, the relatively low cost of Census Bureau data and its availability at depository libraries makes TIGER data easily accessible.

As with all sources of GIS data, TIGER data is not suitable for use at scales larger than that at which it was compiled. In the case of TIGER data this scale is 1:100,000--a regional scale which is not recommended for use on the larger scale of a Massachusetts town. MassGIS has found the accuracy of TIGER linework to be inconsistent, especially in metropolitan areas where a variety of source maps were used to compile the TIGER files. Another concern for potential users of this data is the size of the TIGER files. As issued by the Census Bureau, county TIGER files are very large and may strain the processing capacities of microcomputers; the smaller town coverages produced by MassGIS may reduce this problem.

TIGER linework frequently does not match the MassGIS "base map" coverages, so care should be exercised when using other MassGIS datalayers together with the Census datalayer for spatial analysis. For this reason, the individual town coverages may contain small polygons with Census codes relating to neighboring towns.

Due to the large volume of data, not every town in the Commonwealth has been checked systematically. The TIGER files contain many errors that were created by the Census Bureau during the production process -- for example, legitimate arcs that are smaller than 0.1 feet in length. While these arcs have little meaning in a cartographic database, they are part of the TIGER data structure; without them, the relationship between graphics and attributes is degraded or destroyed. In order to maintain this relationship, MassGIS does not intend to edit or make corrections to the TIGER linework.

For more information about TIGER products, contact the U.S. Census Bureau Boston Office at (617) 424-0510. Information about Census data at depository libraries is available from the Boston Public Library, Government Documents Desk at (617) 536-5400 x 226.

Census Block (TIGER) Datalayer
December 1995

SOURCE

This datalayer was produced from the post-census release of 1990 TIGER/Line files for the fourteen counties of Massachusetts. This datalayer includes the boundaries of all census blocks and can therefore be used in conjunction with Census Bureau data summarized at the census block level – the finest available resolution of census data. To facilitate processing, this datalayer has been broken down from the original county files into town coverages.

PRODUCTION

The Census Block coverages were created by extracting from county TIGER files all linework, line attributes, and polygon attributes. The coverages were enhanced by dropping redundant data items, appending several demographic data items from the STF-1, STF-3a, and PL94-171 census data matrices, and creating an Arc/INFO ADD file for address-matching. Each polygon in the original county TIGER file was assigned a MassGIS town-ID code, ensuring that all of the original polygons appear within the Town TIGER Geography datalayer.

In some cases, polygons within the TIGER line network were not assigned unique *census block* numbers by the Census Bureau. That is, more than one polygon was assigned a single census block number, and is thereby related to the same record in the matrices of demographic data published by the Census Bureau. In order to overcome the problem of redundantly assigning data values from the matrices to the TIGER Geography coverages' polygon attribute tables on the basis of these non-unique census block numbers, MassGIS apportioned numeric values among the polygons on the basis of their relative area. This is arguably incorrect, since it assumes demographic heterogeneity among all polygons assigned the same census block number. However, in all cases observed by MassGIS, such polygons were contiguous and relatively small, so the impact of this error is expected to be minimal.

MassGIS has created street name annotation for use with the TIGER line files. Annotation is stored in the subclass NAME (anno.name) and should be used with textset font if plotting from ArcPlot. Anno.name is based on routes in the TIGER lines, so every named street, as opposed to every single arc, has annotation.

ATTRIBUTES

The Town Census Block Group coverages distributed by MassGIS are accompanied by several INFO database files: the PAT (polygon attribute table), AAT (arc attribute table), and ADD (address-matching table). The format of these tables are described below:

Data items in a Census Block PAT file

item_name	Width	Decimal Places	Type	Is Item Coded?
BLK	4	0	Character	N
TABULATION BLOCK NUMBER				
TIGER ITEM				
BLKGROUP1	0		Integer	N
CENSUS BLOCK GROUP				
REDEFINED FROM CTBNA				
CD101	2	0	Integer	N
CONGRESSIONAL DISTRICTS (US HOUSE OF REPS) - 101ST CONGRESS				
VALID THROUGH 102ND CONGRESS				
CD103	2	0	Integer	N
CONGRESSIONAL DISTRICTS (US HOUSE OF REPS) - 103RD CONGRESS				
CURRENT CONGRESSIONAL DISTRICTS				
CENID	5	0	Integer	N
CENSUS FILE IDENTIFICATION CODE				
TIGER ITEM				
CENPOLID	15	0		N
CENSUS POLYGON ID				
CONCATENATED FROM TIGER ITEMS CENID & POLYID				
COUNTY	3	0	Integer	Y
FIPS COUNTY CODE				
TIGER ITEM				
CTB	6	0	Character	N
CENSUS TRACT/BNA CODE (CHARACTER)				
REDEFINED ITEM				
CTBNA	6	0	Integer	N
CENSUS TRACT/BNA CODE				
TIGER ITEM				
FMCD	5	0	Integer	N
FIPS 55 CODE (MCD/CCD)				
TIGER ITEM				
FPL	5	0	Integer	N
FIPS 55 CODE (PLACE)				
TIGER ITEM 'FPLCDE'				
HU100	16	5	Number	N
HOUSING UNITS				
FROM CENSUS FILE PL94171				
ID-720	13	0	Character	N
CONCATENATED ID FOR SUMMARY LEVEL 720				
RELATE TO CENSUS SUMMARY TAPE FILES & PL-94171 FILES				
ID-750	23	0	Character	N
CONCATENATED ID FOR SUMMARY LEVEL 750				
RELATE TO CENSUS SUMMARY TAPE FILES & PL-94171 FILES				
POLYID	10	0	Integer	N
POLYGON IDENTIFICATION CODE (TEMPORARY)				
TIGER ITEM				
POP100	16	5	Number	N
POPULATION				
FROM CENSUS FILE PL94171				
SAC10	1	0	Character	N
ACTUAL/PSEUDO VOTING DISTRICT CODE				
USED TO VERIFY VTD VALUE				
STATE	2	0	Integer	Y
FIPS STATE CODE				
TIGER ITEM				
TILE-NAME	8	0	Character	N
COVERAGE LOCATION (TILE) IDENTIFIER				
MassGIS TOWN ID				
TRACT-BLOCK	10	0	Character	N
CONCATENATED TRACT AND BLOCK CODES				
VTD	4	0	Character	N
VOTING DISTRICT CODE				
USED IN REDISTRICTING				

Data items in a Census Block AAT file

item_name	Width	Decimal Places	Type	Is Item Coded?
BLK90L	4	0	Character	N
TABULATION BLOCK NUMBER LEFT - 1990 CENSUS				
TIGER ITEM 'BLKL'				
BLK90R	4	0	Character	N
TABULATION BLOCK NUMBER RIGHT - 1990 CENSUS				
TIGER ITEM 'BLKR'				
CFCC	3	0	Character	Y
CENSUS FEATURE CLASS CODE				
TIGER ITEM				
CFCC1	1	0	Character	Y
CENSUS FEATURE CLASS CODE - MAJOR FEATURE TYPE				
REDEFINED ITEM				
CNT90LEFT	3	0	Integer	N
FIPS COUNTY CODE LEFT - 1990 CENSUS				
TIGER ITEM 'COL'				
CNT90RGT	3	0	Integer	N
FIPS COUNTY CODE RIGHT - 1990 CENSUS				
TIGER ITEM 'COR'				
CTBNA90L	6	0	Character	N
CENSUS TRACT/BNA CODE LEFT - 1990 CENSUS				
TIGER ITEM CTBNAL				
CTBNA90R	6	0	Character	N
CENSUS TRACT/BNA CODE RIGHT - 1990 CENSUS				
TIGER ITEM 'CTBNAR'				
FDPRE	2	0	Character	N
FEATURE DIRECTION PREFIX				
TIGER ITEM 'DIRPRE'				
FDSUF	2	0	Character	N
FEATURE DIRECTION SUFFIX				
TIGER ITEM 'DIRSUF'				
FMCDCCD90L	5	0	Integer	N
FIPS 55 CODE LEFT (MDC/CCD) - 1990 CENSUS				
TIGER ITEM 'FMCDL'				
FMCDCCD90R	5	0	Integer	N
FIPS 55 CODE RIGHT (MDC/CCD) - 1990 CENSUS				
TIGER ITEM 'FMCDR'				
FNAME	30	0	Character	N
FEATURE NAME				
TIGER ITEM 'FEANME'				
FPLACO90L	5	0	Integer	N
PLACE CENSUS CODE LEFT				
TIGER ITEM 'PLCDEL'				
FPLACO90R	5	0	Integer	N
PLACE CENSUS CODE RIGHT				
TIGER ITEM 'PLCDER'				
FROMLAT	9	0	Integer	N
LATITUDE FROM (IMPLIED 6 DECIMAL PLACES)				
TIGER ITEM				
FROMLONG	10	0	Integer	N
LONGITUDE FROM (IMPLIED 6 DECIMAL PLACES)				
TIGER ITEM				
FSUBMCD90L	5	0	Integer	N
FIPS 55 CODE LEFT (SUB-MCD) - 1990 CENSUS				
TIGER ITEM 'FSMCDL'				
FSUBMCD90R	5	0	Integer	N
FIPS 55 CODE RIGHT (SUB-MCD) - 1990 CENSUS				
TIGER ITEM 'FSMCDR'				
FTYPE	4	0	Character	N
FEATURE TYPE				
TIGER ITEM 'FEATYP'				
LEFTADD1	11	0	Integer	N
FROM ADDRESS LEFT				
TIGER ITEM 'FRADDL'				
LEFTADD2	11	0	Integer	N
TO ADDRESS LEFT				
TIGER ITEM 'TOADDL'				
LEFTFFL	1	0	Integer	N
FROM IMPUTED ADDRESS FLAG LEFT				
TIGER ITEM 'FRIADDFL'				
LEFTTFL	1	0	Integer	N
TO IMPUTED ADDRESS FLAG LEFT				
TIGER ITEM 'TOIADDFL'				

item_name	Width	Decimal Places	Type	Is Item Coded?
RECNUM	10	0	Integer	N
CENSUS RECORD NUMBER (PERMANENT)				
TIGER ITEM				
RGTADD1	11	0	Integer	N
FROM ADDRESS RIGHT				
TIGER ITEM 'FRADDR'				
RGTADD2	11	0	Integer	N
TO ADDRESS RIGHT				
TIGER ITEM 'TOADDR'				
RGTFFL	1	0	Integer	N
FROM IMPUTED ADDRESS FLAG RIGHT				
TIGER ITEM 'FRIADDFR'				
RGTTFL	1	0	Integer	N
TO IMPUTED ADDRESS FLAG RIGHT				
TIGER ITEM 'TOIADDFR'				
RT	1	0	Integer	N
RECORD TYPE (1 = LINE SEGMENT)				
TIGER ITEM				
SIDE	1	0	Integer	N
SINGLE SIDE SEGMENT CODE (1 = DATA EXIST FOR ONLY ONE SIDE				
OF THE SEGMENT) TIGER ITEM				
SOURCE	1	0	Character	Y
SOURCE CODE				
TIGER ITEM				
ST90LEFT	2	0	Integer	N
FIPS STATE CODE LEFT - 1990 CENSUS				
TIGER ITEM 'STL'				
ST90RGT	2	0	Integer	N
FIPS STATE CODE RIGHT - 1990 CENSUS				
TIGER ITEM 'STR'				
STREET	26	0	Character	N
STREET NAME				
DERIVED FROM FNAME AND FTYPE				
TILE-NAME	8	0	Character	N
COVERAGE LOCATION (TILE) IDENTIFIER				
TOWN ID				
TOLAT	9	0	Integer	N
LATITUDE TO (IMPLIED 6 DECIMAL PLACES)				
TIGER ITEM				
TOLONG	10	0	Integer	N
LONGITUDE TO (IMPLIED 6 DECIMAL PLACES)				
TIGER ITEM				
VERSION	4	0	Integer	N
VERSION NUMBER				
TIGER ITEM				
ZIPCOLEF	5	0	Integer	N
ZIP CODE LEFT (ONLY WHEN ADDRESS RANGE IS PRESENT)				
TIGER ITEM 'ZIPL'				
ZIPCORGT	5	0	Integer	N
ZIP CODE RIGHT (ONLY WHEN ADDRESS RANGE IS PRESENT)				
TIGER ITEM 'ZIPR'				

Data items in a Census Block ADD file:

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	ADDRESS	45	45	C	-	Street address
46	ZONE	15	15	C	-	Special item to account for addresses which appear more than once in a town
61	SIDE	1	1	C	-	Indicates which side(s) of the arc have addresses
62	PARITY	1	1	C	-	Indicates whether address ranges are even, odd, or mixed
63	SOUNDEX	6	6	C	-	Phonetic spelling
69	TIG-<town-id>#	4	5	B	0	
73	TIG-<town-id>-ID	4	5	B	0	

Census Block Group Datalayer
December 1995

SOURCE

This datalayer was produced from 1992 U.S. Census enhanced TIGER/Line files for the fourteen counties of Massachusetts. This datalayer is known as the *block group* datalayer because it includes the boundaries of census block groups only. This datalayer does not contain the TIGER linework which define *census blocks* and is not suitable for address matching -- such data is contained instead in the Census Block datalayer. This datalayer is intended for use in conjunction with Census Bureau data summarized at the census block group level, including matrices included in the 1990 STF-3a publication.

PRODUCTION

The DEP GIS Group created the Census Block Group coverages. The process involves concatenating matchids from the census county code, census tract, and *block group* number with water bodies coded as 'W', dissolving the original tiger/line coverages on the matchids and finally joining the dissolved coverages with the census STF-3A file at the Census Bureau-defined block group level. Block groups are areas that include a variable number of *census blocks* and are used as the summary level for much of the Census Bureau's demographic data. Block groups typically have a population of about 1,000 people. A good amount of demographic data items from the Census Bureau's STF-3a matrices were appended to the polygon attribute tables of these coverages. Items MINPER and SCORE were also added to the polygon attribute table. MINPER, the percentage of minority population, was calculated by summing the following items: NONHISBLK, NONHISASN, NONHISIND, NONHISOTH, HISWHT,HISBLK,HISASN,HISIND and HISOTH, multiplying the value by 100 and then dividing the result by POP100. SCORE categories are based on the percentages of MINPER.

ATTRIBUTES

The polygon attribute table (PAT) files accompanying each Census Block Group coverage contains the following data items (fields):

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	DESCRIPTION
1	AREA	8	18	F	5	Area (square feet)
9	PERIMETE	8	18	F	5	Perimeter (feet)
17	WORC#	4	5	B	-	
21	WORC-ID	4	5	B	-	
25	MATCHID-150	10	10	C	-	Matchid
35	BLCKGR	1	1	C	-	1990 Census Block Group
36	TRACTBNA	6	6	C	-	1990 Census Tract
42	CNTY	3	3	C	-	1990 Census County Code
45	HU100	4	9	B	-	Number of Housing Units
49	POP100	4	9	B	-	100-percent count of Persons
53	PERSONS	4	9	B	-	Sample Count of Persons
57	HOUSEHOLDS	4	9	B	-	Households
61	WHITES	4	9	B	-	Caucasian
65	BLACKS	4	9	B	-	African American
69	AMERINDS	4	9	B	-	American Indian
73	ASIANS	4	9	B	-	Asian
77	OTHER	4	9	B	-	Other Race
81	HISPANICS	4	9	B	-	Persons of Hispanic Origin
85	NONHISWHT	4	9	B	-	Non-Hispanic Caucasian
89	NONHISBLK	4	9	B	-	Non-Hispanic African American
93	NONHISASN	4	9	B	-	Non-Hispanic Asian
97	NONHISIND	4	9	B	-	Non-Hispanic American Indian
101	NONHISOTH	4	9	B	-	Non-Hispanic Other Race
105	HISWHT	4	9	B	-	Hispanic Caucasian
109	HISBLK	4	9	B	-	Hispanic African American
113	HISIND	4	9	B	-	Hispanic American Indian
117	HISASN	4	9	B	-	Hispanic Asian
121	HISOTH	4	9	B	-	Hispanic Other Race
125	PIHH1	4	9	B	-	1 Person in Household
129	PIHH2	4	9	B	-	2 People in Household
133	PIHH3	4	9	B	-	3 People in Household
137	PIHH4	4	9	B	-	4 People in Household
141	PIHH5	4	9	B	-	5 People in Household
145	PIHH6	4	9	B	-	6 People in Household
149	PIHH7	4	9	B	-	7 People in Household
153	INC<5000	4	9	B	-	Income < $5000

```
157 INC<10000      4   9 B   -  Income = $5000-$9999
161 INC<12500      4   9 B   -  Income = $10000-$12499
165 INC<15000      4   9 B   -  Income = $12500-$14999
169 INC<17500      4   9 B   -  Income = $15000-$17499
173 INC<20000      4   9 B   -  Income = $17500-$19999
177 INC<22500      4   9 B   -  Income = $20000-$22499
181 INC<25000      4   9 B   -  Income = $22500-$24999
185 INC<27500      4   9 B   -  Income = $25000-$27499
189 INC<30000      4   9 B   -  Income = $27500-$29999
193 INC<32500      4   9 B   -  Income = $30000-$32499
197 INC<35000      4   9 B   -  Income = $32500-$34999
201 INC<37500      4   9 B   -  Income = $35000-$37499
205 INC<40000      4   9 B   -  Income = $37500-$39999
209 INC<42500      4   9 B   -  Income = $40000-$42499
213 INC<45000      4   9 B   -  Income = $42500-$44999
217 INC<47500      4   9 B   -  Income = $45000-$47499
221 INC<50000      4   9 B   -  Income = $47500-$49999
225 INC<55000      4   9 B   -  Income = $50000-$54999
229 INC<60000      4   9 B   -  Income = $55000-$59999
233 INC<75000      4   9 B   -  Income = $60000-$74999
237 INC<100K       4   9 B   -  Income = $75000-$99999
241 INC<125K       4   9 B   -  Income = $100000-$124999
245 INC<150K       4   9 B   -  Income = $125000-$149999
249 INC>150K       4   9 B   -  Income >= $150000
253 BLKPER         4   9 B   -  African American Percentage of Total Population
257 WHTPER         4   9 B   -  Caucasian Percentage of Total Population
261 INDPER         4   9 B   -  American Indian Percentage of Total Population
265 ASNPER         4   9 B   -  Asian Percentage of Total Population
269 OTHPER         4   9 B   -  Other race Percentage of Total Population
273 HISPER         4   9 B   -  Hispanics Percentage of Total Population
277 SUMRACE        4   9 B   -  Summary of Five Races
281 PUBWAT         4   9 B   -  Water from Public/Private Water Supply System
285 DRILLWELL      4   9 B   -  Water from a Drilled Well
289 DUGWELL        4   9 B   -  Water from a dug Well
293 OTHWAT         4   9 B   -  Water from Some Other Sources
297 PUBSEW         4   9 B   - Public Sewer System
301 SEPTIC         4   9 B   -  Septic Tanks/Cesspool
305 OTHSEW         4   9 B   -  Other Means of Sewage Disposal
309 VAL<15K        4   9 B   -  House Value < $15000
313 VAL<20K        4   9 B   -  House Value = $15000-$19999
317 VAL<25K        4   9 B   -  House Value = $20000-$24999
321 VAL<30K        4   9 B   -  House Value = $25000-$29999
325 VAL<35K        4   9 B   -  House Value = $30000-$34999
329 VAL<40K        4   9 B   -  House Value = $35000-$39999
333 VAL<45K        4   9 B   -  House Value = $40000-$44999
337 VAL<50K        4   9 B   -  House Value = $45000-$49999
341 VAL<60K        4   9 B   -  House Value = $50000-$59999
345 VAL<75K        4   9 B   -  House Value = $60000-$74999
349 VAL<100K       4   9 B   -  House Value = $75000-$99999
353 VAL<125K       4   9 B   -  House Value = $100000-$124999
357 VAL<150K       4   9 B   -  House Value = $125000-$149999
361 VAL<175K       4   9 B   -  House Value = $150000-$174999
365 VAL<200K       4   9 B   -  House Value = $175000-$199999
369 VAL<250K       4   9 B   -  House Value = $200000-$249999
373 VAL<300K       4   9 B   -  House Value = $250000-$299999
377 VAL<400K       4   9 B   -  House Value = $300000-$399999
381 VAL<500K       4   9 B   -  House Value = $400000-$499999
385 VAL>500K       4   9 B   -  House Value >= $500000
389 MEDHHINC       4   9 B   -  Median Household Income
393 MEDHHVAL       4   9 B   -  Median Housing Value
397 MINPER         4   9 B   -  Percentage of Minority Population
401 SCORE          1   1 I   -  0 - Percentage of Minority Population LE 25%
                                2 - Percentage of Minority Population GT 25% and LE 50%
                                3 - Percentage of Minority Population GT 50% and LE 75%
                                4 - Percentage of Minority Population GT 75%
  **  REDEFINED ITEMS  **
 34 WATER           1   1 C   -  'W' Means Water body
```

Sample record from a PAT

This record shows census tract 7022 block group 1 in Worcester County, where 1147 people live in 469 housing units. Of these housing units, 72 units are supplied with water from an outside source (a public or privately operated water system) and 70 units dispose of sewage in an offsite (public or privately operated) sewage system. There are 1142 Caucasians and 5 African Americans. The median household income is $33,333 and the median housing value is $109,200.

```
AREA          =  1167267198.10086
PERIMETER     =     210,940.75628
BG#           =    2
BG-ID         =    1
MATCHID-150   =0277022001
BLCKGR        =1
TRACTBNA      =702200
CNTY          =027
HU100         =469
POP100        =1,147
PERSONS =1,147
HOUSEHOLDS = 412
WHITES =    1,142
BLACKS   =  5
```

AMERINDS = 0
ASIANS = 0
OTHER = 0
HISPANICS = 5
NONHISWHT = 1,137
NONHISBLK = 5
NONHISASN = 0
NONHISIND = 0
NONHISOTH = 0
HISWHT = 5
HISBLK = 0
HISIND = 0
HISASN = 0
HISOTH = 0
PIHH1 = 78
PIHH2 = 126
PIHH3 = 64
PIHH4 = 90
PIHH5 = 43
PIHH6 = 7
PIHH7 = 4
INC<5000 = 10
INC<10000 = 37
INC<12500 = 15
INC<15000 = 8
INC<17500 = 17
INC<20000 = 15
INC<22500 = 17
INC<25000 = 13
INC<27500 = 23
INC<30000 = 14
INC<32500 = 29
INC<35000 = 24
INC<37500 = 19
INC<40000 = 14
INC<42500 = 30
INC<45000 = 25
INC<47500 = 8
INC<50000 = 14
INC<55000 = 18
INC<60000 = 23
INC<75000 = 25
INC<100K = 14
INC<125K = 0
INC<150K = 0
INC>150K = 0
BLKPER = 0
WHTPER = 99
INDPER = 0
ASNPER = 0
OTHPER = 0
HISPER = 0
SUMRACE = 1,147
PUBWAT = 72
DRILLWELL = 281
DUGWELL = 110
OTHWAT = 6
PUBSEW = 70
SEPTIC = 391
OTHSEW = 8
VAL<15K = 0
VAL<20K = 0
VAL<25K = 0
VAL<30K = 0
VAL<35K = 5
VAL<40K = 0
VAL<45K = 2
VAL<50K = 2
VAL<60K = 6
VAL<75K = 9
VAL<100K = 50
VAL<125K = 72
VAL<150K = 30
VAL<175K = 16
VAL<200K = 3
VAL<250K = 4
VAL<300K = 0
VAL<400K = 0
VAL<500K = 0
VAL>500K = 2
MEDHHINC = 33,333
MEDHHVAL = 109,200
WATER =
MINPER = 25.20
SCORE = 2

Cape Cod Commission Datalayers
August 1998

OVERVIEW

These coverages are the Cape Cod Commission GIS department's datalayers that are the result of data development at the CCC GIS since 1988. These themes, delivered to MassGIS for general distribution statewide, are those most extensively used by the Commission's programs and have been created primarily to support the Commission's Regional Policy Plan and Local Comprehensive Plans with each of the fifteen towns of Cape Cod. These coverages also have value to other agencies, especially the towns that the CCC works for, as well as State and Federal agencies. Some layers used by the CCC and released to MassGIS were digitized from the 1990 Association for the Preservation of Cape Cod (APCC) Atlas.

Three towns on Cape Cod -- Barnstable, Orleans, and Yarmouth -- have their own GIS and have developed many GIS layers. Yarmouth has chosen to maintain control of the distribution of data the town has developed, and has requested that the CCC and MassGIS not redistribute their parcel coverages. Yarmouth should be contacted to obtain copies of its digital data. Files for Yarmouth that are distributed by MassGIS have been developed by the CCC and do not carry this restriction. **The Cape Cod Commission requests that use of any of its coverages or data bases to generate maps, analyses, or reports be followed by a credit to the Cape Cod Commission as the source of the data.**

Some of the coverages are near-duplicates of layers developed by other state agencies, such as public water supplies (Mass. DEP) or anadromous fish runs (Fisheries and Wildlife). MassGIS is releasing both the layers developed by the Cape Cod Commission and those from various state agencies. Users should note the source dates of each layer. Most importantly, layers developed by DEP that may have influence in regulatory matters (i.e. solid waste facilities, zone IIs) may be more complete and should be used instead of those from the Cape Cod Commission.

PRODUCTION

Most of the coverages the Cape Cod Commission provided to MassGIS were digitized from paper maps using a Calcomp 9100 digitizer and ARC/INFO. Source material varies by layer. Some original manuscripts were obtained from the 1990 APCC Atlas; others came from town sources. Other layers were produced with on-screen digitizing in Arcedit. Attribute information for parcel and zoning coverages came from town planning and engineering departments' and assessors' databases. MassGIS performed quality checking on all layers and standardized all attrribute tables before creating the libraries.

WHAT MassGIS PROVIDES

MassGIS has populated two ARC/INFO libraries with the CCC datasets. The CAPE library comprises cape-wide or multi-town layers. The CAPETOWN library consists of layers for single towns. The following are lists, with brief descriptions, of each library's layers.

CAPE Library:

LAYER	Description
ALLMWRA4	Cape Cod major marine water recharge areas
APCCPHAB	Cape Cod's endangered plant habitat from 1990 APCC Atlas
APCCVEG	Cape Cod's critical communities and habitat from 1990 APCC Atlas
APCCWET	Cape Cod wetlands from 1990 APCC Atlas
APCCWHAB	Cape Cod's wildlife habitat from 1990 APCC Atlas
BIKE10	Bike paths and routes (1996)

BUSBUFF2	Scheduled bus route buffer for Cape Cod from 1991 Regional Policy Plan
BUSRT2	Capewide bus routes from 1991 Regional Policy Plan
BUSSTAT	Bus stations on Cape Cod
CCNSS	Cape Cod national seashore boundary from parcel maps
CCPARBND	Parcel level coastlines and town boudaries of Cape Cod
CPSVWELL	Cape Cod small volume wells - representing DEP's regulatory definition of " small volume wells"
DGWYAW1	New town boundary along Bass River between Dennis and Yarmouth created from surveyed coordinates
FERRY	Origination points and routes of Cape Cod ferry boats and whale watch boats
FISHRUN2	Anadromous fish runs for Cape Cod
FWRECH9	Fresh water recharge areas for ponds and lakes for Cape Cod - not available for all ponds
INDUSTR5	Cape Cod industrial sites pre-screened in Industrial Land Survey Project of 1994
MAJDUNES	Cape Cod's major dunes from 1990 APCC Atlas
MMRBND1	Outline of Massachusetts Military Reservation (1997)
MMRHWPNT	Mass Military Reservation hazardous waste points
MMRSITES	Mass Military Reservation hazardous waste sites from June 1993 community involvement plan and hazwrap
MMRTOXN7	Mass Military Reservation pollution plumes version 7 (1996)
NEWZOC13	All of Cape Cod's "zones of contribution" for public supply wells - also called wellhead protection areas
OKHWHD96	Old Kings Highway historic district for 1996
PLUME96	Suspected or potential pollution plumes for Cape Cod, mainly from landfills and treatment plants (1996)
PONDBUF	300 foot buffer of ponds from MacConnell 1990 landuse for Cape Cod
PUBWELLS	Public supply wells for Cape Cod - 1996
SCENIC	Department of Environmental Managements Scenic Landscape Inventory for Cape Cod (1990)
SHELFISH	Cape Cod potential shellfish habitat areas - general areas that could support shellfish, not actual locations
VERNAL	Cape Cod vernal pools from 1990 APCC Atlas
VILLAGES	Names of Cape Cod villages and their approximate location
WASTDSP2	Cape Cod waste disposal areas version 2 (from parcel coverages)
WATRDIST	Water resource protection districts for public water supplies
WATRTAB2	Groundwater table contours from USGS ten foot intervals where available
WWTF96	Waste water treatment facilities for 1996 Regional Policy Plan update

CAPETOWN Library:

LAYER	Description
PARCELS	Parcel boundaries and assessor's database information (for all towns except Yarmouth). See chart below for source date of assessor's attributes for each town. Coverage name is PAR.
PIPES	Water supply pipes. Shows streets served by water mains; they do not represent the exact location of the pipes (as in which side of the street they are on). Most of the original scales ranged from one inch = 50 ft. to one inch = 1000 ft. Available for all Cape towns except Eastham, Truro and Wellfleet. Coverage name is PIP.
SEWER	Areas in town with access to sewer system. Available only for Barnstable, Chatham, and Falmouth. Coverage name is SEW.

ATTRIBUTES

CAPE Library:

The following coverages have .PATs or .AATs that contain items other than the standard items.

Items in the **ALLMWRA4.PAT**:

ALT-NAME	50	50	C	-	NAME GIVEN TO THE SYSTEM
GROUPING	5	5	C	-	EMBAYMENT OR SYSTEM
ACRES	12	12	I	-	DIGITIZED AREA IN FEET DIVIDED BY 43560
NO3DONE	1	1	C	-	NITROGEN LOADING CALCULATIONS COMPLETED
WATER	1	1	C	-	FIELD USED TO IDENTIFY LAND OR WATER PORTION

Items in the **APCCVEG.PAT**:

VEGTYPE	2	2	C	-	TYPES OF HABITAT CLASSIFIED MAINLY BY VEGETATIVE COVER
ACRES	8	8	N	2	NUMBER OF ACRES CALCULATED FROM THE DIGITIZED AREA

Items in the **APCCWET.PAT**:

HABTYPE	2	2	C	-	TYPE OF WETLAND CLASSIFIED BY VEGETATION
ACRES	8	8	N	2	NUMBER OF ACRES CALCULATED FROM AREA OF DIGITIZED POLYGON

Items in the **BIKE10.AAT**:

TYPE	3	3	C	-	TYPE OF BIKE ROUTE THE LINE IS (Proposed, existing, along street)

Items in the **BUSSTAT.PAT**:

TYPE	10	10	C	-	TYPE OF BUS STATION
SYMB	2	2	C	-	SYMBOL SHOWN ON LRTP MAPS

Items in the **CCNSS.PAT**:

ACREAGE	9	9	N	1	AREA IN ACRES

Items in the **CCPARBND.PAT**:

TOWN	3	3	C	-	TOWN NAME: 3-LETTER USGS DESIGNATION OF TOWN (See below for codes)
ACRES	12	12	N	3	ACRES IN THE POLYGON

Items in the **CPSVWELL.PAT**:

W-TYPE	4	4	C	-	WELL TYPE FOLLOWING DEP DEFINITIONS
SYMBOL	3	3	I	-	ARCPLOT MARKER SYMBOL - REFERS TO A CUSTOM MARKERSET
W-ID	5	5	I	-	IDENTIFICATION NUMBER TO MATCH WITH TABLES ON MAPS AND IN REPORT
TOWN	21	21	C	-	NAME OF TOWN WELL IS LOCATED IN

Items in the **FERRY.PAT**:

SYMB	1	1	C	-	SYMBOL FOR CARTOGRAPHIC PRESENTATION

Items in the **FWRECH9.PAT**:

TYPE	1	1	C	-	DESIGNATIONS FOR LAND, ISLAND OR WATER AREA

Items in the **INDUSTR5.PAT**:

TOWN	2	2	C	-	NAME OF TOWN INDUSTRIAL SITE IS IN
SITE	2	2	I	-	SEPARATE FIELD FOR SITE NUMBER
NAME	8	8	C	-	TOWN NAME ABBREVIATION FOLLOWED BY SITE NUMBER AS LISTED IN SURVEY REPORT

Items in the **MMRHWPNT.PAT**:

TYPE	3	3	C	-	DESIGNATION OF SOURCE OF POLLUTION ASSIGNED BY MILITARY
NUMBER	3	3	I	-	NUMBER OF POLLUTION SOURCE - COMBINES WITH "TYPE"
PREFIX	4	4	C	-	INITIALS OF BRANCH OF MILITARY THAT IS (OR WAS) RESPONSIBLE FOR THE
PROPERTY					

Items in the **MMRSITES.PAT**:

TYPE	3	3	C	-	DESIGNATION OF POLLUTION SOURCE
NUMBER	3	3	I	-	SPILL NUMBER - USED IN COMBINATION WITH "TYPE"
PREFIX	4	4	C	-	AGENCY RESPONSIBLE FOR PROPERTY WHEN SPILL OCCURED

Items in the **NEWZOC13.PAT**:

INZOC	1	1	C	-	USED IN OVERLAY ANALYSIS TO LABEL NEW COVERAGE POLYS THAT ARE "IN THE ZOC"

Items in the **OKHWHD96.PAT**:

ID	6	6	C	-	DISTRICT ID FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
TC	3	3	C	-	TOWN CENTER FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
HN	65	65	C	-	HISTORIC NAME FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
TOWNCODE	8	8	C	-	FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC

FORMNO	6	6	C	-	FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
HISTNAME	65	65	C	-	SAME AS HN - FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
PROPCOUNT	9	9	C	-	NUMBER OF PROPERTIES - FROM ORIGINAL COVERAGE - NOT MAINTAINED BY CCC
LHD	6	6	C	-	LOCAL HISTORIC DISTRICT - NOT MAINTAINED BY CCC

Items in the **PONDBUF.PAT**:

INSIDE	4	5	B	-	DESIGNATES THE INSIDE OF THE BUFFER

Items in the **PUBWELLS.PAT**:

ID	4	4	I	-	USGS ID FOR WELL DATA BASE - NOT MAINTAINED BY CCC
NAME	40	40	C	-	WATER DEPARTMENT NAME
CITY	15	15	C	-	TOWN WATER DEPARTMENT WELL IS IN - NOT ALWAYS THE TOWN THE WELL IS IN
MP-IDENTIFIER	15	15	C	-	LATTITUDE-LONGITUDE USED BY USGS TO CREATE THE SITE IN THE ORIGINAL COV.
DESCRIPTION	15	15	C	-	USGS NAME FOR THE WELL - NOT MAINTAINED BY CCC
MP-PERMIT#	9	9	C	-	MASS DEP WELL PERMIT NUMBER - NOT MAINTAINED BY CCC
SOURCE	5	5	C	-	AGENCY RESPONSIBLE FOR REPORTING THE WELL LOCATION IN ORIGINAL COVERAGE
NEW	1	1	C	-	YES (Y) OR NO (N)
TYPE	20	20	C	-	OPERATIONAL STATUS OF WELL
SHORTNAME	12	12	C	-	SHORTENED VERSION OF WELL NAME FOR LABELTEXT ON MAPS
LENS	10	10	C	-	GROUNDWATER LENS NAME

Items in the **SCENIC.PAT**:

LANDSCAPE	11	11	C	-	DEM'S LANDSCAPE CLASSIFICATION
SYMBOL	3	3	I	-	ARCPLOT SHADE SYMBOL ITEM

Items in the **SHELFISH.PAT**:

ISLAND	1	1	C	-	ISLAND POLYGON DESIGNATION
STATUS	1	1	C	-	STATUS OF THE AREA FOR SHELLFISH HARVESTING
ACRES	7	7	N	1	AREA IN ACRES

Items in the **VILLAGES.PAT**:

NAME	15	15	C	-	VILLAGE NAME
HISTORIC	1	1	C	-	IDENTIFIES WHICH VILLAGE IS CONSIDERED HISTORIC

Items in the **WASTDSP2.PAT**:

STATUS	8	4	C	-	STATUS OF SITE
ADDRESS	40	30	C	-	ADDRESS OF SITE
CLOSE-SML	6	6	C	-	
KIND	9	9	C	-	TYPE OF DISPOSAL SITE
ACRES	4	4	I	-	AREA IN ACRES
OWNERSHIP	10	7	C	-	STATUS OF OWNERSHIP
WSID	20	20	C	-	
LTPY85	10	10	I	-	
USE85	8	5	C	-	
REFUSE	1	1	C	-	YES OR NO
DEMOL	1	1	C	-	YES OR NO
STUMPS	1	1	C	-	YES OR NO
ASH	1	1	C	-	YES OR NO
SLUDGE	10	10	C	-	
SUPERFUND	1	1	C	-	
SPEC-WASTE	9	9	C	-	
EXPANSION	19	19	C	-	NO/INTENDED/APPROVED
LEACH-COLL	13	13	C	-	YES OR NO
LINER	1	1	C	-	YES OR NO
MONITOR	13	10	C	-	
CAPPING	20	15	C	-	
TOWN	15	15	C	-	TOWN OF SITE
QUAD	4	4	I	-	USGS QUAD OF SITE
NAME	30	30	C	-	SITE NAME
INZOCRANK	1	1	I	-	
SIZERANK	1	1	I	-	
LEGRAND	20	20	C	-	
LEGZ	4	4	C	-	
DIST-INZOC	6	6	I	-	
DIST-OUTZOC	6	6	I	-	
RISK	6	6	N	2	
RISK-CAT	1	1	I	-	
OUTZRANK	2	2	I	-	
NAME2	15	15	C	-	
DEPTH-RANK	2	2	I	-	
SIZE-RANK	2	2	I	-	
LINER-RANK	2	2	I	-	
LEACH-RANK	2	2	I	-	
THICK-RANK	2	2	I	-	
STAR	1	1	C	-	
TRANS	2	2	C	-	
RECYC	1	1	C	-	
**** REDEFINED ITEMS ****					
DEPTH	1	1	I	-	
GRADIENT	1	1	I	-	GRAD-RANK (ALTERNATE NAME)
THICK	2	2	C	-	

Items in the **WATRDIST.PAT**:

LOC	3	3	C	-	LOCATION OF WATER DISTRICT

Items in the **WATRTAB2.AAT**:

INTERVAL	4	5	B	-	CONTOUR ELEVATION IN FEET ABOUVE MEAN SEA LEVEL
LENS	4	4	C	-	NAME OF GROUNDWATER LENS THAT CONTOURS ARE FOR

CAPETOWN Library:

Items in the **PAR.PAT**:

TOWN-ID	3	3	I	Town identification number
GISLINK	7	7	I	Link to assessor's database
TOWN-GIS	10	10	C	Combined TOWN-ID and GISLINK code, used to uniquely identify any parcel across the Cape
MAP	6	6	C	Assessors' map number
BLOCK	8	8	C	Assessors' block number
LOT	22	22	C	Assessors' lot number
STREET_NO	9	9	C	Street address number
STREET_NAME	32	32	C	Street address name
STATECLASS	3	3	I	State class code form assessors' database
ACRES	12	12	N	Assessed parcel size in acres
PD-RD	1	1	C	Identifies polygons that are not parcels: 'P' for pond or 'R' for road.

Items in the **PIP.AAT**:

DIAMETER	4	4	N	1	Pipe diameter in inches

Items in the **SEW.PAT**:

SEWERED	2	2	C	Whether the polygon is a sewered area ('Y' or 'N')

Source date for CAPETOWN.PARCELS (as listed in Info table $CAPETOWN/database/PAR.PXS):

BARNSTABLE	1996	EASTHAM	1997	PROVINCETOWN	1993
BOURNE	1995	FALMOUTH	1994	SANDWICH	1993
BREWSTER	1996	HARWICH	1993	TRURO	1993
CHATHAM	1996	MASHPEE	1994	WELLFLEET	1989
DENNIS	1993	ORLEANS	1996	YARMOUTH	No parcels data

RELATED TABLES

In order to preserve all original attribute information as originally developed by either the towns or the Cape Cod Commission, the polygon attribute tables for the parcels and zoning layers are available as related INFO tables in the $CAPETOWN/database directory. Because the items differ among the original .PATs, these tables can be used to relate to individual coverages rather than the library as a whole, based on the '-ID' items. Two sets of tables exist: the original parcel .PATs are named according to their three-letter character designations given to the towns of Cape Cod by the USGS plus the letters 'PAR' along with a '.PRT' extension. Original zoning .PATs have the three-letter code with 'ZON' and a '.PRT' extension. Relates also can be set up using another INFO table in $CAPETOWN/database - TOWNCODE.DAT, which contains the three-letter USGS code ('CAPECODE'), town and town-id.

TOWNCODE.DAT is as follows:

CAPECODE	TOWN	TOWN-ID
A1W	BARNSTABLE	20
BHW	BOURNE	36
BMW	BREWSTER	41
CGW	CHATHAM	55
DGW	DENNIS	75
EGW	EASTHAM	86
FSW	FALMOUTH	96
HJW	HARWICH	126
MIW	MASHPEE	172
OSW	ORLEANS	224
PZW	PROVINCETOWN	242
SDW	SANDWICH	261
TSW	TRURO	300
WNW	WELLFLEET	318
YAW	YARMOUTH	351

As an example of the original.PATs, the original parcel .PAT for Barnstable is named A1WPAR.PRT.

Original metadata for the $CAPETOWN library created by the Cape Cod Commission are stored as Info files in directories under the $CAPETOWN/database directory (parmeta, pipmeta, sewmeta, and zonmeta). These files are named according to the three-letter CAPECODE and have a .CCC

extension. The original .DOC, .PAD, .PAC, .AAD, and .AAC files, if available, are stored here as well. Original metadata (with the .CCC extension) for the $CAPE library are stored as Info files in $CAPE/database. Some of these .CCC files may mention 'NAD27' or 'stateplane feet,' referring to original datums. All data from the Cape Cod Commission have been projected into Mass. State Plane NAD83 meters.

MAINTENANCE

MassGIS is not maintaining these data. Future updates of any of these layers will be done by the Cape Cod Commission GIS staff prior to subsequent release by MassGIS. For current status of any of the aforementioned datasets please contact Gary Prahm, GIS Manager at the Cape Cod Commission, at (508) 362-3828. For more information on the Cape Cod Commission, visit its site on the World Wide Web at http://www.vsa.cape.com/~cccom/.

Digital Orthophoto Annotation Datalayer
December 1995

OVERVIEW

The annotation in this datalayer is specifically placed and scaled to be used in conjunction with the 1:5,000 Black and White Digital Orthophoto images. They are tiled by Orthophoto Index Grid sheets. Each coverage is named **AN** in layer **ANNO_OQ**.

PRODUCTION

The annotation is based on the USGS GEONAMES coverage. The annotation was selected and placed so that each Ortho Index Grid Sheet has identifiable landmarks. Each Index Sheet annotation coverage has road names, town names, hilltops, site names, streams, ponds and reservoirs. Arc/INFO annotation subclasses segregate the annotation into PLACE, ROAD and HYDRO. The point coverage associated with the annotation is used to locate marker symbols that differentiate the road types (State, U.S. Route, Interstate).

ATTRIBUTES

The SYMBOL item of the .PAT contains the code for the appropriate symbol. A specialized markerset and fontset have been developed for displaying the annotation on the Orthophotos.

```
Arc: items an149918.pat
```

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME
AREA	8	18	F	5	-
PERIMETER	8	18	F	5	-
AN149918#	4	5	B	-	-
AN149918-ID	4	5	B	-	-
SYMBOL	4	4	I	-	-

The MARKERINFO for OQROADS.MRK is:

```
Arcplot: markersym 4 (THIS IS FOR THE INTERSTATE ROUTES)
Arcplot: markerinfo

Markeroffset: X=0, Y=0
Markerscale factor is 1 in X, 1 in Y.

Layer Font Pattern    Angle     Size     Layer-Offset Pensize Linecap Linejoin
   1   31     52    0.000  0.200  0.200  0.000  0.000  0.030    BUTT    MITER
   1 Color: C-0.000% M-100.000% Y-100.000% K-0.000% (Red)
   1 Marker mask: NONE

Arcplot: markersym 5 (THIS IS FOR THE US ROUTES)
Arcplot: markerinfo

Markeroffset: X=0, Y=0
Markerscale factor is 1 in X, 1 in Y.

Layer Font Pattern    Angle     Size     Layer-Offset Pensize Linecap Linejoin
   1   31     50    0.000  0.200  0.200  0.000  0.000  0.030    BUTT    MITER
   1 Color: C-0.000% M-100.000% Y-100.000% K-0.000% (Red)
   1 Marker mask: NONE
Arcplot: markersym 6  (THIS IS FOR THE STATE ROUTES)
Arcplot: markerinfo

Markeroffset: X=0, Y=0
Markerscale factor is 1 in X, 1 in Y.

Layer Font Pattern    Angle     Size     Layer-Offset Pensize Linecap Linejoin
   1   31     51    0.000  0.200  0.200  0.000  0.000  0.030    BUTT    MITER
   1 Color: C-0.000% M-100.000% Y-100.000% K-0.000% (Red)
   1 Marker mask: NONE
```

The symbol numbers for the fonts used refer to the Arc/INFO textset FONT symbols. The revised textset F_HALO.TXT has "black" halos around "white" fonts so that the anno will be visible over white or black images. The size of the annotation is based on cartographic constraints as well as importance. This annotation is scaled specifically for display at 1:5000. The sizes listed below are for use in ARCEDIT and represent Meters. The meters to "Point size" conversion for a 1:5,000 scale [(pts size * .014/39.37)*5000] is:

10 pt. = 17.780 m
12 pt. = 21.082 m
14 pt. = 24.892 m
18 pt. = 32.004 m
24 pt. = 42.672 m
36 pt. = 64.008 m

Each Subclass is segmented into the following layers:

SUBCLASS:	LAYER:
Hydro- Font #17	1) Size 64
	2) Size 42
	3) Size 32
	4) Size 24
	5) Size 21
	6) Size 17
	7) Size 14
Road- Font #9	1) Size 21 (Roads Names)
	2) Size 21 (Roads Numbers)
Places- Font #16	1) Size 32
	2) Size 24
Font # 8	3) Size 21
Font # 7	4) Size 21

Here is a typical listing of the $ALL items in ARCEDIT:

$ID	=	7
$SYMBOL	=	9
$LEVEL	=	1
$SIZE	=	21.08200
$TEXT	=	LAKE
$OFFSETX	=	0.00000
$OFFSETY	=	0.00000
$WORD	=	0
$JUSTIFY	=	LL
$FIT	=	OFF
$ALIGN	=	

MAINTENANCE

This datalayer is maintained by MassGIS. Annotation is available for approximately ten percent of the state, mostly in the Quabbin-Ware-Wachusett Watershed area. There are no current plans to continue developing this layer.

Geographic Place Names Datalayer
April 2000

OVERVIEW

This datalayer represents place names for geographic features, grouped into three categories:

- hydrographic features - lakes, ponds, streams, rivers, bays, harbors, channels
- civic features - city and town names, sections, villages
- hypsographic features - hills, mountains, points, beaches, islands

The data were taken from an older statewide datalayer named GEONAMES, based on annotation as it appears on the U.S. Geological Survey's 1:24,000/1:25,000 Topographic maps. The GIS Group at the Massachusetts Department of Environmental Protection underwent a statewide quality checking of the data, which included adjusting the position of each label to best match its feature.

This datalayer, also named **GEONAMES**, is stored in the QUAD library. ARC/INFO coverages of feature type Annotation are named **GNM**. Three subclasses of annotation exist: HYDRO, PLACES, and HYPSO.

MAINTENANCE

The DEP GIS Group maintains the data.

Adjacent States' Town Boundaries Datalayers
January 1998

OVERVIEW

These datalayers represent the municipal boundaries of the five states that border Massachusetts, plus those of Maine. These layers are stored in the NE library. The following list describes the original source and scale of the data and how MassGIS obtained them:

- **CTTOWNS** - Connecticut; USGS 1:24,000 Topographic Quad maps, obtained from CT Dept. of Environmental Protection Natural Resources Center.
- **METOWNS** - Maine; USGS 1:62,500 Quad series, obtained from ME Dept. of Conservation in 1990.
- **NHTOWNS** - New Hampshire; 1:250,000 statewide manuscript, obtained from NH Granit (NH state GIS program) in 1990.
- **NYTOWNS** - New York; NY State Office of Real Property Services, obtained from NH Granit office.
- **RITOWNS** - Rhode Island; USGS 1:24,000 Topographic Quad maps, obtained from RIGIS (Rhode Island GIS) in 1989.
- **VTTOWNS** - Vermont; USGS 1:250,000 maps, obtained from Vermont Office of GIS.

All six layers were projected to the Massachusetts State Plane Mainland coordinate system, NAD83 datum, units meters, for use with all other MassGIS data. Please note that the layers vary in quality and are distributed for use only in regional mapping.

ATTRIBUTES

Each coverage has a polygon attribute table (.PAT). The items for each are as follows:

CTTOWNS.PAT:
TNA (Alternate name TOWN) - Town name
FEATURE - Towns in the Connecticut River Basin = 1, outside of basin = 0
ACRES - Area of town in acres

METOWNS.PAT:
COUNTY-ID - Maine County ID
TOWN-ID - Maine Town ID
TOWN - Town name
ALT-ID - Alternate TOWN-ID

NHTOWNS.PAT:
FIPS - Federal Information Processing Standard Census code
NAME - Town name
COUNTY - Redefined item (1st digit of FIPS item)

NYTOWNS.PAT:
LABEL - Town name
SWIS - Unique New York State municipality identification code

RITOWNS.PAT:
NAME - Town name
OSP-CODE - Unique town identifier
TFIPS-CODE - Town FIPS (US Census) code
CFIPS-CODE - County FIPS (US Census) code
COUNTY - County name
LAND - Land feature (1 = land, 0 = water)

VTTOWNS.PAT:
VTTOWN# - Unique town identifier
FIPS - US Census FIPS Code
TOWNNAME (Alternate name TN) - Town name
RPC - Regional Planning Commission Abbreviation
** REDEFINED ITEMS **
COUNTY - FIPS County code
TOWN-CODE (Alternate name) TC - FIPS Town code

MAINTENANCE

As stated above, MassGIS distributes these layers for use in regional mapping and does not maintain or update them. For web links to each state's GIS program, please see the "Where to Turn for More Information" page.

New England Boundary Datalayers
July 1998

OVERVIEW

These datalayers represent the outlines of the states bordering Massachusetts, plus that of Maine. The layer names are as follows (with coverage name in parentheses):

- **NE_MASK** - "Mask" around the Massachusetts border, for plotting purposes
- **NEWENGLAND** (**NEWNGLND**) - Outlines of the New England States

Both layers were projected to the Massachusetts State Plane Mainland coordinate system, NAD83 datum, units meters, for use with all other MassGIS data. Please note that the layers are general in nature and are distributed only for plotting purposes.

ATTRIBUTES

Each coverage has a polygon attribute table (.PAT). The items for each are as follows:

NE_MASK.PAT:

TYPE - Code for each state:
1 - Connecticut
2 - Maine
3 - New Hampshire
4 - Rhode Island
5 - Vermont
7 - New York

NEWNGLND.PAT:

FIPS - State FIPS (US Census ID)
NAME - State name
ACRES - Total state acreage

MAINTENANCE

MassGIS maintains these layers.

Atlantic Canadian Provinces Datalayers
April 1997

OVERVIEW

This datalayer represents the general boundaries of the eastern Canadian provinces, including Nova Scotia, New Brunswick, and Prince Edward Island. The layer and coverage are both named ATLNPROV, stored in the NE library. The Massachusetts Department of Fisheries and Wildlife GIS program obtained the dataset from Environment Canada's GIS office. The layer was projected to the Massachusetts State Plane Mainland coordinate system, NAD83 datum, units meters, for use with all other MassGIS data. **Please note that the layers are general in nature and are distributed only for small-scale plotting purposes**.

ATTRIBUTES

The ATLNPROV.PAT (polygon attribute table) contains the following items:

SQMILES	Area of polygon in square miles
LAND	Land areas = 1, water bodies = 0
PROVINCE	Province name

MAINTENANCE

MassGIS maintains these layers.

Town Numbers and Corresponding Names

1 ABINGTON
2 ACTON
3 ACUSHNET
4 ADAMS
5 AGAWAM
6 ALFORD
7 AMESBURY
8 AMHERST
9 ANDOVER
10 ARLINGTON
11 ASHBURNHAM
12 ASHBY
13 ASHFIELD
14 ASHLAND
15 ATHOL
16 ATTLEBORO
17 AUBURN
18 AVON
19 AYER
20 BARNSTABLE
21 BARRE
22 BECKET
23 BEDFORD
24 BELCHERTOWN
25 BELLINGHAM
26 BELMONT
27 BERKLEY
28 BERLIN
29 BERNARDSTON
30 BEVERLY
31 BILLERICA
32 BLACKSTONE
33 BLANDFORD
34 BOLTON
35 BOSTON
36 BOURNE
37 BOXBOROUGH
38 BOXFORD
39 BOYLSTON
40 BRAINTREE
41 BREWSTER
42 BRIDGEWATER
43 BRIMFIELD
44 BROCKTON
45 BROOKFIELD
46 BROOKLINE
47 BUCKLAND
48 BURLINGTON
49 CAMBRIDGE
50 CANTON
51 CARLISLE
52 CARVER
53 CHARLEMONT
54 CHARLTON
55 CHATHAM
56 CHELMSFORD
57 CHELSEA
58 CHESHIRE
59 CHESTER
60 CHESTERFIELD
61 CHICOPEE
62 CHILMARK
63 CLARKSBURG
64 CLINTON
65 COHASSET
66 COLRAIN
67 CONCORD
68 CONWAY
69 CUMMINGTON
70 DALTON
71 DANVERS
72 DARTMOUTH
73 DEDHAM
74 DEERFIELD
75 DENNIS
76 DIGHTON
77 DOUGLAS
78 DOVER
79 DRACUT
80 DUDLEY
81 DUNSTABLE
82 DUXBURY
83 EAST BRIDGEWATER
84 EAST BROOKFIELD
85 EAST LONGMEADOW
86 EASTHAM
87 EASTHAMPTON
88 EASTON
89 EDGARTOWN
90 EGREMONT
91 ERVING
92 ESSEX
93 EVERETT
94 FAIRHAVEN
95 FALL RIVER
96 FALMOUTH
97 FITCHBURG
98 FLORIDA
99 FOXBOROUGH
100 FRAMINGHAM
101 FRANKLIN
102 FREETOWN
103 GARDNER
104 GAY HEAD
105 GEORGETOWN
106 GILL
107 GLOUCESTER
108 GOSHEN
109 GOSNOLD
110 GRAFTON
111 GRANBY
112 GRANVILLE
113 GREAT BARRINGTON
114 GREENFIELD
115 GROTON
116 GROVELAND
117 HADLEY
118 HALIFAX
119 HAMILTON
120 HAMPDEN
121 HANCOCK
122 HANOVER
123 HANSON
124 HARDWICK
125 HARVARD
126 HARWICH
127 HATFIELD
128 HAVERHILL
129 HAWLEY
130 HEATH
131 HINGHAM
132 HINSDALE
133 HOLBROOK
134 HOLDEN
135 HOLLAND
136 HOLLISTON
137 HOLYOKE
138 HOPEDALE
139 HOPKINTON
140 HUBBARDSTON
141 HUDSON
142 HULL
143 HUNTINGTON
144 IPSWICH
145 KINGSTON
146 LAKEVILLE
147 LANCASTER
148 LANESBOROUGH
149 LAWRENCE
150 LEE
151 LEICESTER
152 LENOX
153 LEOMINSTER
154 LEVERETT
155 LEXINGTON
156 LEYDEN
157 LINCOLN
158 LITTLETON
159 LONGMEADOW
160 LOWELL
161 LUDLOW
162 LUNENBURG
163 LYNN
164 LYNNFIELD
165 MALDEN
166 MANCHESTER
167 MANSFIELD
168 MARBLEHEAD
169 MARION
170 MARLBOROUGH
171 MARSHFIELD
172 MASHPEE
173 MATTAPOISETT
174 MAYNARD
175 MEDFIELD
176 MEDFORD
177 MEDWAY
178 MELROSE
179 MENDON
180 MERRIMAC
181 METHUEN
182 MIDDLEBOROUGH
183 MIDDLEFIELD
184 MIDDLETON
185 MILFORD
186 MILLBURY
187 MILLIS
188 MILLVILLE
189 MILTON
190 MONROE
191 MONSON
192 MONTAGUE
193 MONTEREY
194 MONTGOMERY
195 MOUNT WASHINGTON
196 NAHANT
197 NANTUCKET
198 NATICK
199 NEEDHAM
200 NEW ASHFORD
201 NEW BEDFORD
202 NEW BRAINTREE
203 NEW MARLBOROUGH
204 NEW SALEM
205 NEWBURY
206 NEWBURYPORT
207 NEWTON
208 NORFOLK
209 NORTH ADAMS
210 NORTH ANDOVER
211 NORTH ATTLEBOROUGH
212 NORTH BROOKFIELD
213 NORTH READING
214 NORTHAMPTON
215 NORTHBOROUGH
216 NORTHBRIDGE
217 NORTHFIELD
218 NORTON
219 NORWELL
220 NORWOOD
221 OAK BLUFFS
222 OAKHAM
223 ORANGE
224 ORLEANS
225 OTIS
226 OXFORD
227 PALMER
228 PAXTON
229 PEABODY
230 PELHAM
231 PEMBROKE
232 PEPPERELL
233 PERU
234 PETERSHAM
235 PHILLIPSTON
236 PITTSFIELD
237 PLAINFIELD
238 PLAINVILLE
239 PLYMOUTH
240 PLYMPTON
241 PRINCETON
242 PROVINCETOWN
243 QUINCY
244 RANDOLPH
245 RAYNHAM
246 READING
247 REHOBOTH
248 REVERE
249 RICHMOND
250 ROCHESTER
251 ROCKLAND
252 ROCKPORT
253 ROWE
254 ROWLEY
255 ROYALSTON
256 RUSSELL
257 RUTLAND
258 SALEM
259 SALISBURY
260 SANDISFIELD
261 SANDWICH
262 SAUGUS
263 SAVOY
264 SCITUATE
265 SEEKONK
266 SHARON
267 SHEFFIELD
268 SHELBURNE
269 SHERBORN
270 SHIRLEY
271 SHREWSBURY
272 SHUTESBURY
273 SOMERSET
274 SOMERVILLE
275 SOUTH HADLEY
276 SOUTHAMPTON
277 SOUTHBOROUGH
278 SOUTHBRIDGE
279 SOUTHWICK
280 SPENCER
281 SPRINGFIELD
282 STERLING
283 STOCKBRIDGE
284 STONEHAM
285 STOUGHTON
286 STOW
287 STURBRIDGE
288 SUDBURY
289 SUNDERLAND
290 SUTTON
291 SWAMPSCOTT
292 SWANSEA
293 TAUNTON
294 TEMPLETON
295 TEWKSBURY
296 TISBURY
297 TOLLAND
298 TOPSFIELD
299 TOWNSEND
300 TRURO
301 TYNGSBOROUGH
302 TYRINGHAM
303 UPTON
304 UXBRIDGE
305 WAKEFIELD
306 WALES
307 WALPOLE
308 WALTHAM
309 WARE
310 WAREHAM
311 WARREN
312 WARWICK
313 WASHINGTON
314 WATERTOWN
315 WAYLAND
316 WEBSTER
317 WELLESLEY
318 WELLFLEET
319 WENDELL
320 WENHAM
321 WEST BOYLSTON
322 WEST BRIDGEWATER
323 WEST BROOKFIELD
324 WEST NEWBURY
325 WEST SPRINGFIELD
326 WEST STOCKBRIDGE
327 WEST TISBURY
328 WESTBOROUGH
329 WESTFIELD
330 WESTFORD
331 WESTHAMPTON
332 WESTMINSTER
333 WESTON
334 WESTPORT
335 WESTWOOD
336 WEYMOUTH
337 WHATELY
338 WHITMAN
339 WILBRAHAM
340 WILLIAMSBURG
341 WILLIAMSTOWN
342 WILMINGTON
343 WINCHENDON
344 WINCHESTER
345 WINDSOR
346 WINTHROP
347 WOBURN
348 WORCESTER
349 WORTHINGTON
350 WRENTHAM
351 YARMOUTH

1:25,000 USGS Topographic Quadrangle Numbers and Corresponding Names

1 CANAAN
2 STATE LINE
3 EGREMONT
4 BASHBISH FALLS
4-W COPAKE
5 BERLIN
6 HANCOCK
7 PITTSFIELD WEST
8 STOCKBRIDGE
9 GREAT BARRINGTON
10 ASHLEY FALLS
11 WILLIAMSTOWN
12 CHESHIRE
13 PITTSFIELD EAST
14 EAST LEE
15 MONTEREY
16 SOUTH SANDISFIELD
17 NORTH ADAMS
18 WINDSOR
19 PERU
20 BECKET
21 OTIS
22 TOLLAND CENTER
23 ROWE
24 PLAINFIELD
25 WORTHINGTON
26 CHESTER
27 BLANDFORD
28 WEST GRANVILLE
29 HEATH
30 ASHFIELD
31 GOSHEN
32 WESTHAMPTON
33 WORONOCO
34 SOUTHWICK
34-S TARIFFVILE
35 COLRAIN
36 SHELBURNE FALLS
37 WILLIAMSBURG
38 EASTHAMPTON
39 MOUNT TOM
40 WEST SPRINGFIELD
41 BERNARDSTON
42 GREENFIELD
43 MT. TOBY
44 MT HOLYOKE
45 SPRINGFIELD NORTH
46 SPRINGFIELD SOUTH
47 NORTHFIELD
48 MILLERS FALLS
49 SHUTESBURY
50 BELCHERTOWN
51 LUDLOW
52 HAMPDEN
53 MT GRACE
54 ORANGE
55 QUABBIN RESERVOIR
56 WINSOR DAM
57 PALMER
58 MONSON
59 ROYALSTON
60 ATHOL
61 PETERSHAM
62 WARE
63 WARREN
64 WALES
65 WINCHENDON
66 TEMPLETON
67 BARRE
68 NORTH BROOKFIELD
69 EAST BROOKFIELD
70 SOUTHBRIDGE
71 ASHBURNHAM
72 GARDNER
73 WACHUSETT MIN
74 PAXTON
75 LEICESTER
76 WEBSTER
77 ASHBY
78 FITCHBURG
79 STERLING
80 WORCESTER NORTH
81 WORCESTER SOUTH
82 OXFORD
83 TOWNSEND
84 SHIRLEY
85 CLINTON
86 SHREWSBURY
87 GRAFTON
88 UXBRIDGE
89 PEPPERELL
90 AYER
91 HUDSON
92 MARLBOROUGH
93 MILFORD
94 BLACKSTONE
95 NASHUA SOUTH
96 WESTFORD
97 MAYNARD
98 FRAMINGHAM
99 HOLLISTON
100 FRANKLIN
101 PAWTUCKET
102 LOWELL
103 BILLERICA
104 CONCORD
105 NATICK
106 MEDFIELD
107 WRENTHAM
108 ATTLEBORO
109 EAST PROVIDENCE
110 BRISTOL
111 SALEM DEPOT
112 LAWRENCE
113 WILMINGTON
114 LEXINGTON
115 NEWTON
116 NORWOOD
117 MANSFIELD
118 NORTON
119 SOMERSET
120 FALL RIVER
121 TIVERTON
122 HAVERHILL
123 SOUTH GROVELAND
124 READING
125 BOSTON NORTH
126 BOSTON SOUTH
127 BLUE HILLS
128 BROCKTON
129 TAUNTON
130 ASSONET
131 FALL RIVER EAST
132 WESTPORT
133 EXETER
134 NEWBURYPORT WEST
135 GEORGETOWN
136 SALEM
137 LYNN
138 HULL
139 WEYMOUTH
140 WHITMAN
141 BRIDGEWATER
142 ASSAWOMPSET POND
143 NEW BEDFORD NORTH
144 NEW BEDFORD SOUTH
145 CUTTYHUNK
146 NEWBURYPORT EAST
147 IPSWICH
148 MARBLEHEAD NORTH
149 MARBLEHEAD SOUTH
150 NANTASKET BEACH
151 COHASSET
152 HANOVER
153 PLYMPTON
154 SNIPATUIT POND
155 MARION
156 SCONTICUT NECK
157 NAUSHON ISLAND
158 SQUIBNOCKET
159 GLOUCESTER
160 SCITUATE
161 DUXBURY
162 PLYMOUTH
163 WAREHAM
164 ONSET
165 WOODS HOLE
166 VINEYARD HAVEN
167 TISBURY GREAT POND
168 ROCKPORT
169 MANOMET
170 SAGAMORE
171 POCASSET
172 FALMOUTH
173 EDGARTOWN
174 SANDWICH
175 COTUIT
176 HYANNIS
177 TUCKERNUCK ISLAND
178 PROVINCETOWN
179 DENNIS
180 NANTUCKET
181 NORTH TRURO
182 WELLFLEET
183 ORLEANS
184 HARWICH
185 CHATHAM
186 MONOMOY POINT
187 GREAT POINT
188 SIASCONSET
189 HAMPTON

1:25,000 Digital Quadrangle Numbers and Corresponding Names

Note: These numbers are used in the naming convention of ArcInfo Export files and Shapefiles on CD data sets and on the MassGIS free online Data Download Web site. Export files are named according to number at left of Quad name. Shapefiles use number at left of name, except where number in parentheses is listed at right of name, in which case this number is used in the Shapefile name.

1 CANAAN
2 STATE LINE
3 EGREMONT
4 BASHBISH FALLS
4-W COPAKE (322)
5 BERLIN
6 HANCOCK
7 PITTSFIELD WEST
8 STOCKBRIDGE
9 GREAT BARRINGTON
10 ASHLEY FALLS
11 WILLIAMSTOWN
12 CHESHIRE
13 PITTSFIELD EAST
14 EAST LEE
15 MONTEREY
16 SOUTH SANDISFIELD
17 NORTH ADAMS
18 WINDSOR
19 PERU
20 BECKET
21 OTIS
22 TOLLAND CENTER
23 ROWE
24 PLAINFIELD
25 WORTHINGTON
26 CHESTER
27 BLANDFORD
28 WEST GRANVILLE
29 HEATH
30 ASHFIELD
31 GOSHEN
32 WESTHAMPTON
33 WORONOCO
34 SOUTHWICK
34-S TARIFFVILE (323)
35 COLRAIN
36 SHELBURNE FALLS
37 WILLIAMSBURG
38 EASTHAMPTON
39 MOUNT TOM
40 WEST SPRINGFIELD
41 BERNARDSTON
42 GREENFIELD
43 MT. TOBY
44 MT HOLYOKE
45 SPRINGFIELD NORTH
46 SPRINGFIELD SOUTH
47 NORTHFIELD
48 MILLERS FALLS
49 SHUTESBURY
50 BELCHERTOWN
51 LUDLOW
52 HAMPDEN
53 MT GRACE
54 ORANGE
55 QUABBIN RESERVOIR
56 WINSOR DAM
57 PALMER
58 MONSON
59 ROYALSTON
60 ATHOL
61 PETERSHAM
62 WARE
63 WARREN
64 WALES
65 WINCHENDON
66 TEMPLETON
67 BARRE
68 NORTH BROOKFIELD
69 EAST BROOKFIELD
70 SOUTHBRIDGE
71 ASHBURNHAM
72 GARDNER
73 WACHUSETT MIN
74 PAXTON
75 LEICESTER
76 WEBSTER
77 ASHBY
78 FITCHBURG
79 STERLING
80 WORCESTER NORTH
81 WORCESTER SOUTH
82 OXFORD
83 TOWNSEND
84 SHIRLEY
85 CLINTON
86 SHREWSBURY
87 GRAFTON
88 UXBRIDGE
89 PEPPERELL
90 AYER
91 HUDSON
92 MARLBOROUGH
93 MILFORD
94 BLACKSTONE
95 NASHUA SOUTH
96 WESTFORD
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98 FRAMINGHAM
99 HOLLISTON
100 FRANKLIN
101 PAWTUCKET
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107 WRENTHAM
108 ATTLEBORO
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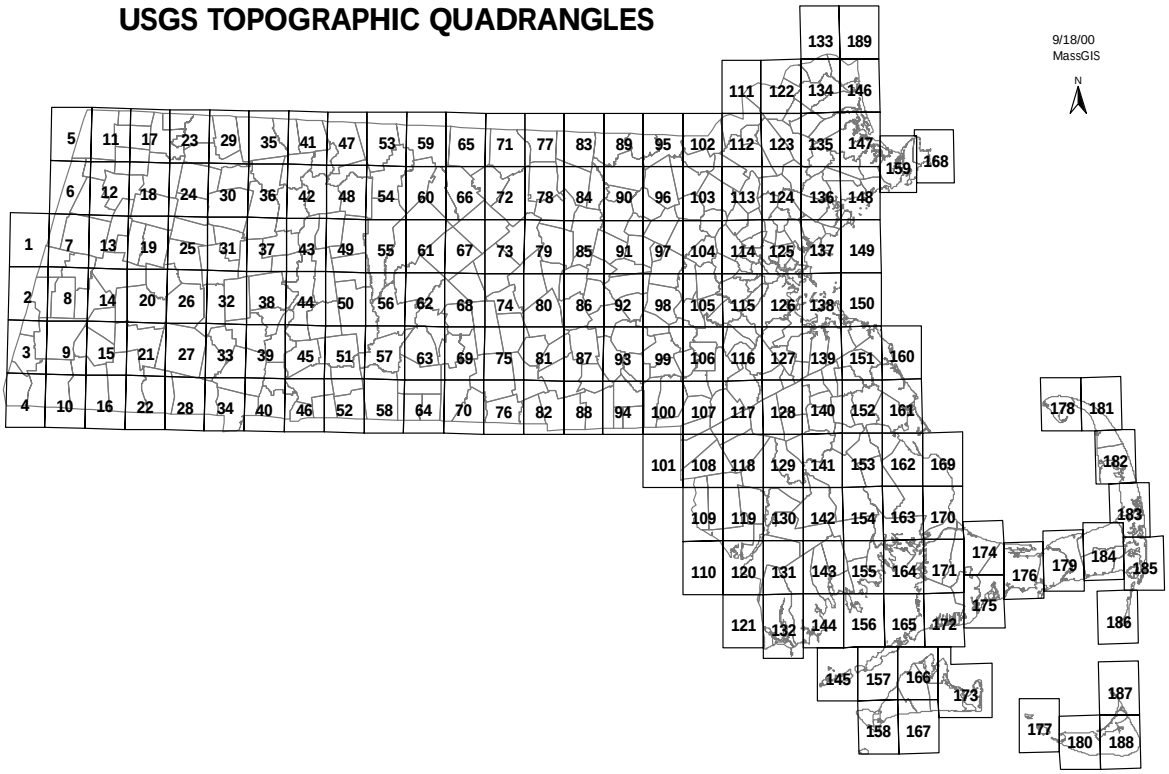
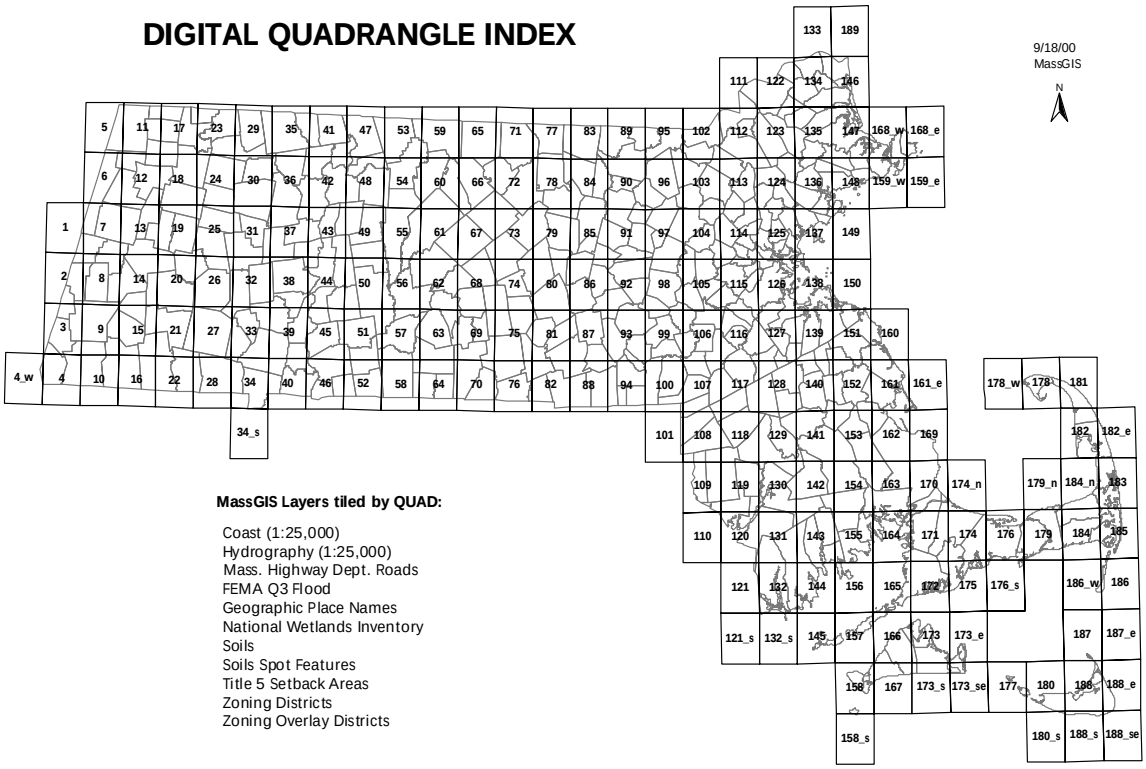
110 BRISTOL
111 SALEM DEPOT
112 LAWRENCE
113 WILMINGTON
114 LEXINGTON
115 NEWTON
116 NORWOOD
117 MANSFIELD
118 NORTON
119 SOMERSET
120 FALL RIVER
121-S TIVERTON SOUTH
121 TIVERTON
122 HAVERHILL
123 SOUTH GROVELAND
124 READING
125 BOSTON NORTH
126 BOSTON SOUTH
127 BLUE HILLS
128 BROCKTON
129 TAUNTON
130 ASSONET
131 FALL RIVER EAST
132-S WESTPORT SOUTH
132 WESTPORT
133 EXETER
134 NEWBURYPORT WEST
135 GEORGETOWN
136 SALEM
137 LYNN
138 HULL
139 WEYMOUTH
140 WHITMAN
141 BRIDGEWATER
142 ASSAWOMPSET POND
143 NEW BEDFORD NORTH
144 NEW BEDFORD SOUTH
145 CUTTYHUNK
146 NEWBURYPORT EAST
147 IPSWICH
148 MARBLEHEAD NORTH
149 MARBLEHEAD SOUTH
150 NANTASKET BEACH
151 COHASSET
152 HANOVER
153 PLYMPTON
154 SNIPATUIT POND
155 MARION
156 SCONTICUT NECK
157 NAUSHON ISLAND
158 SQUIBNOCKET
158-S SQUIBNOCKET SOUTH (320)
159-W GLOUCESTER WEST (159)
159-E GLOUCESTER EAST (168)
160 SCITUATE
161 DUXBURY
161-E DUXBURY EAST (302)
162 PLYMOUTH
163 WAREHAM
164 ONSET
165 WOODS HOLE
166 VINEYARD HAVEN
167 TISBURY GREAT POND
168-E ROCKPORT EAST (300)
168-W ROCKPORT WEST (301)
169 MANOMET
170 SAGAMORE
171 POCASSET
172 FALMOUTH
173-SE EDGARTOWN-SE (315)
173 EDGARTOWN (312)
173-S EDGARTOWN SOUTH (173)
173-E EDGARTOWN EAST (311)
174-N SANDWICH NORTH (306)
174 SANDWICH
175 COTUIT
176-S HYANNIS SOUTH (318)
176 HYANNIS
177 TUCKERNUCK ISLAND
178 PROVINCETOWN
179 DENNIS
179-N DENNIS NORTH (305)
180-S NANTUCKET SOUTH (180)
180 NANTUCKET (314)
181 NORTH TRURO
182 WELLFLEET
182-E WELLFLEET EAST (303)
183 ORLEANS (304)
184 HARWICH
184-N HARWICH NORTH (183)
185 CHATHAM
186 MONOMOY POINT (307)
186-W MONOMOY POINT WEST (186)
187-E GREAT POINT EAST (309)
187 GREAT POINT (310)
188-E SIASCONSET EAST (313)
188 SIASCONSET (187)
188-S SIASCONSET SOUTH (188)
188-SE SIASCONSET SE (316)
189 HAMPTON

USGS TOPOGRAPHIC QUADRANGLES



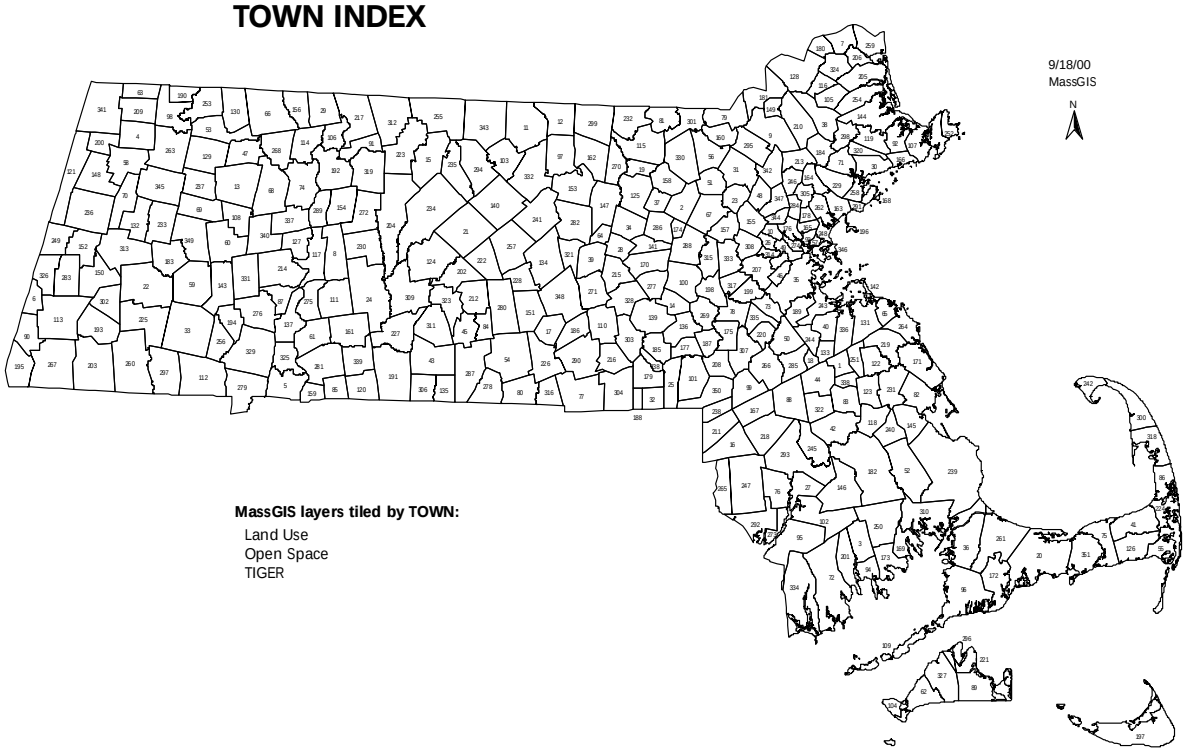
DIGITAL QUADRANGLE INDEX



MassGIS Layers tiled by QUAD:

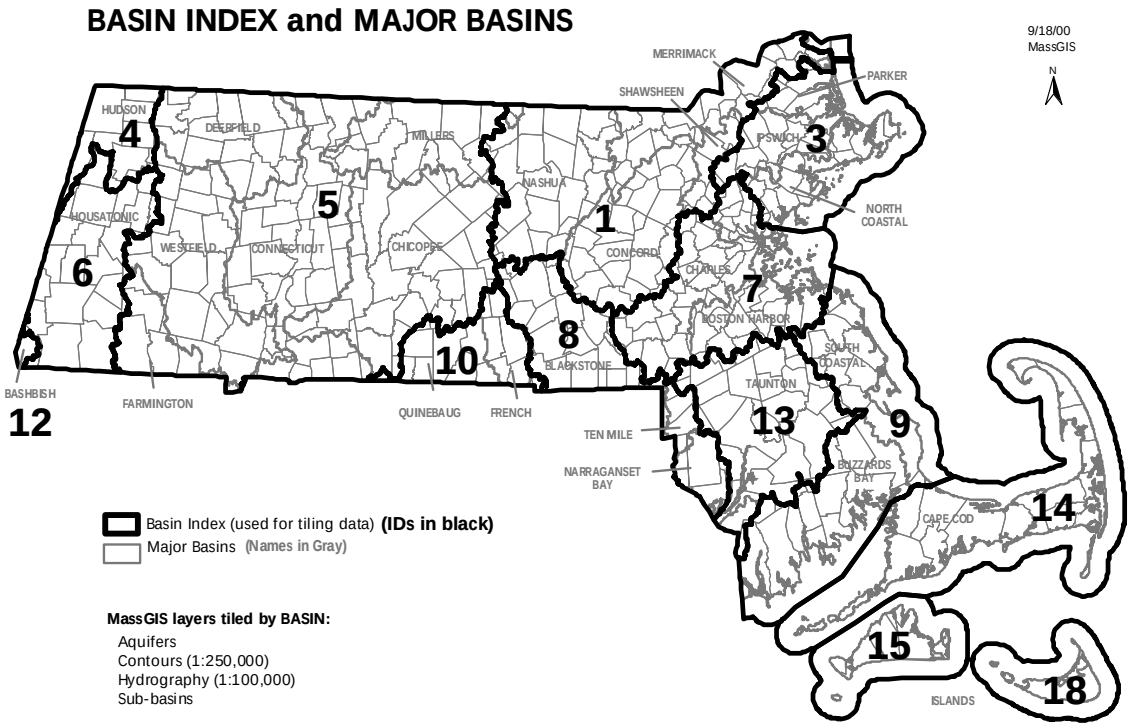
Coast (1:25,000)
Hydrography (1:25,000)
Mass. Highway Dept. Roads
FEMA Q3 Flood
Geographic Place Names
National Wetlands Inventory
Soils
Soils Spot Features
Title 5 Setback Areas
Zoning Districts
Zoning Overlay Districts

TOWN INDEX



MassGIS layers tiled by TOWN:

Land Use
Open Space
TIGER


BASIN INDEX and MAJOR BASINS
9/18/00
MassGIS
N
MERRIMACK
PARKER
SHAWSHEEN
HUDSON
DEERFIELD
MILLERS
IPSWICH
NASHUA
NORTH COASTAL
HOUSATONIC
WESTFIELD
CONNECTICUT
CHICOPEE
CONCORD
CHARLES
BOSTON HARBOR
SOUTH COASTAL
BLACKSTONE
TAUNTON
BASHBISH
FARMINGTON
QUINEBAUG
FRENCH
TEN MILE
NARRAGANSET BAY
BUZZARDS BAY
CAPE COD
ISLANDS
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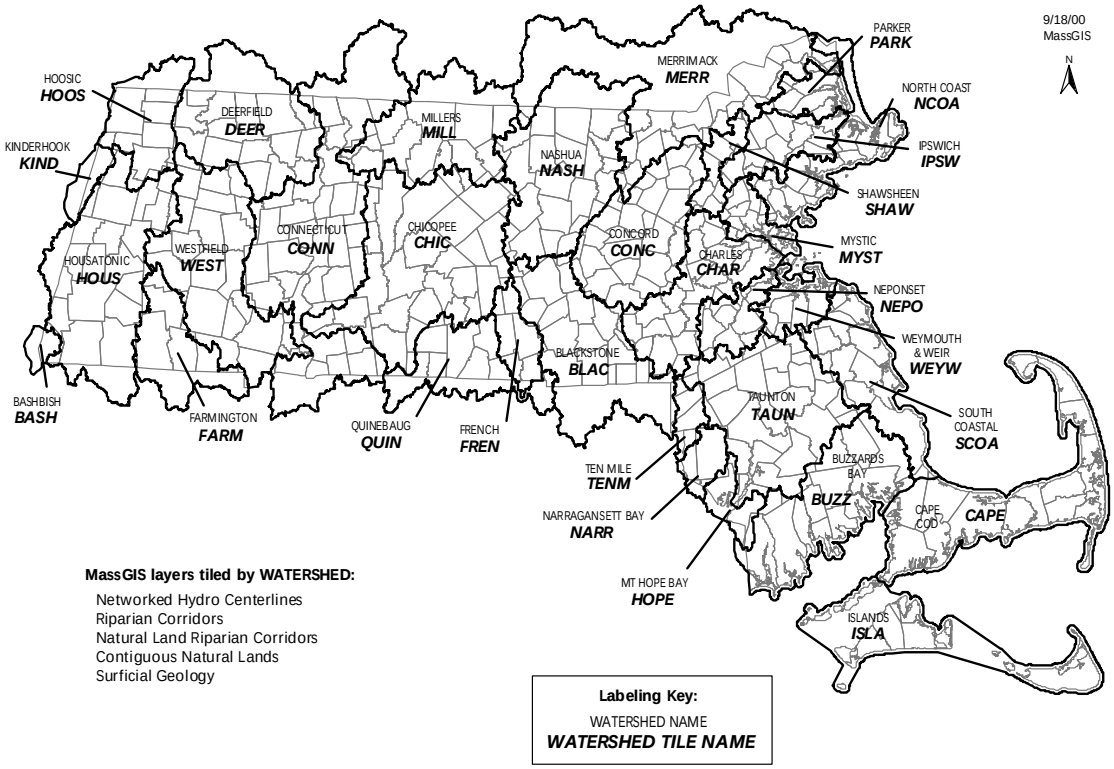
Basin Index (used for tiling data) (IDs in black)
Major Basins (Names in Gray)
MassGIS layers tiled by BASIN:
Aquifers
Contours (1:250,000)
Hydrography (1:100,000)
Sub-basins

WATERSHED INDEX



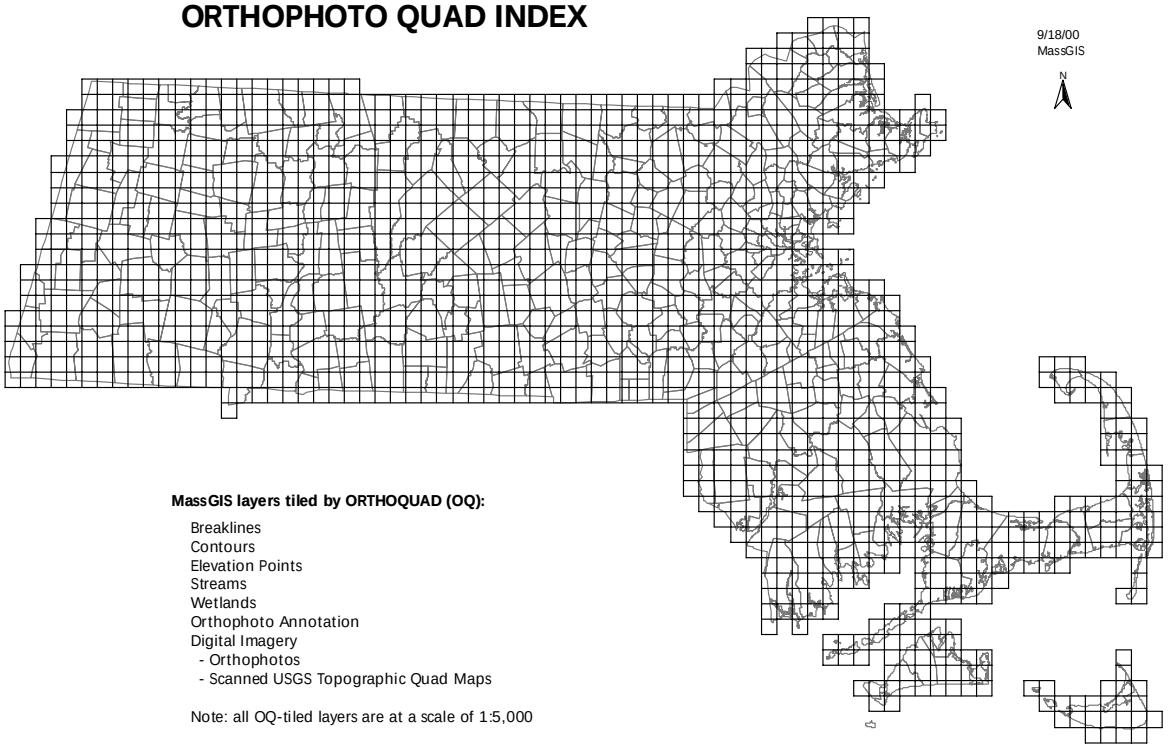
MassGIS layers tiled by WATERSHED:

Networked Hydro Centerlines
Riparian Corridors
Natural Land Riparian Corridors
Contiguous Natural Lands
Surficial Geology

Labeling Key:

WATERSHED NAME
WATERSHED TILE NAME

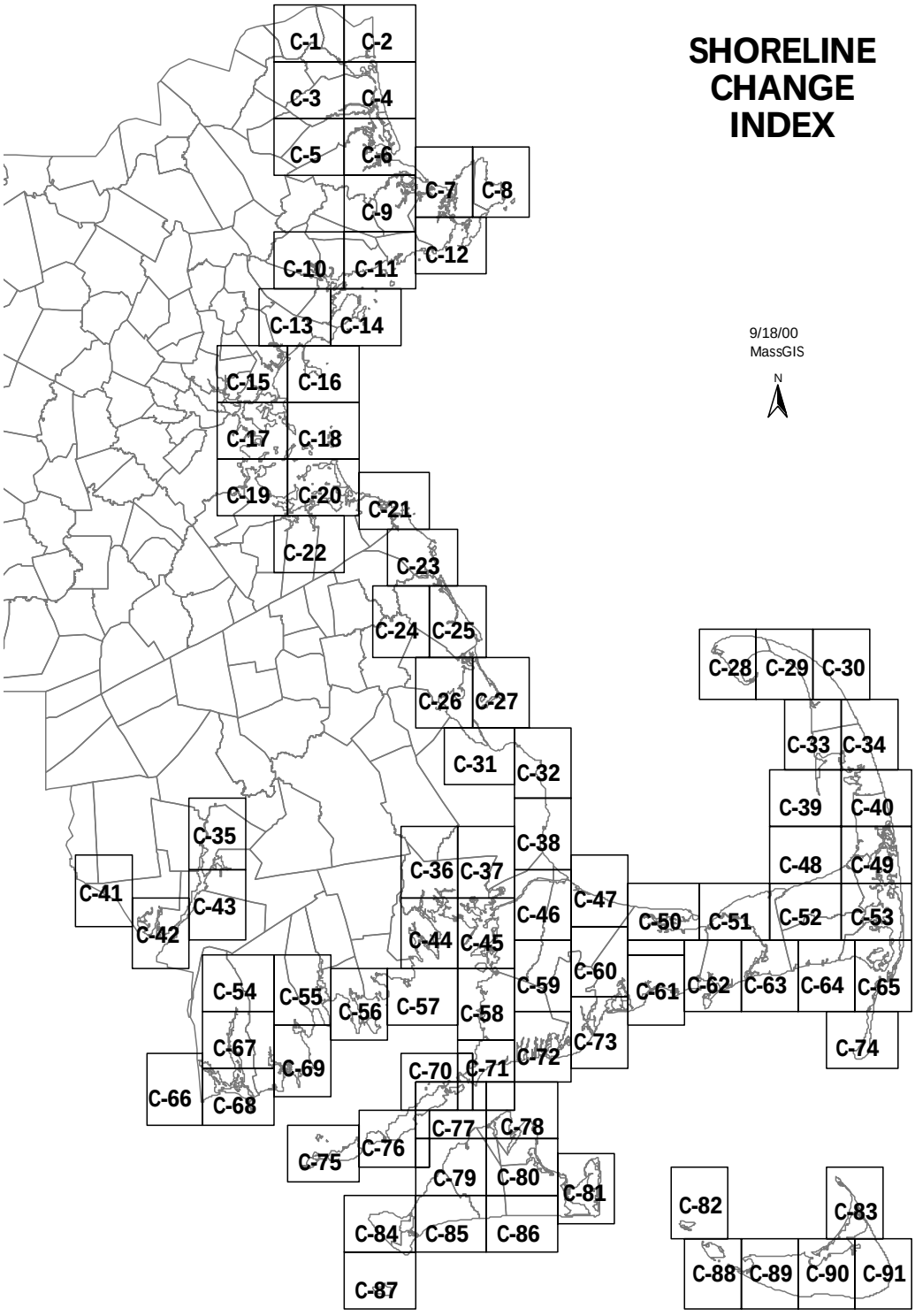
ORTHOPHOTO QUAD INDEX



MassGIS layers tiled by ORTHOQUAD (OQ):

Breaklines
Contours
Elevation Points
Streams
Wetlands
Orthophoto Annotation
Digital Imagery
- Orthophotos
- Scanned USGS Topographic Quad Maps

Note: all OQ-tiled layers are at a scale of 1:5,000


SHORELINE CHANGE INDEX
9/18/00
MassGIS
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C-2
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1-METER MrSID ORTHOPHOTO MOSAIC TILING SCHEME